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SENATE ARMED SERVICES COMMITTEE  
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UNITED STATES SENATE

PRESENTATION TO THE  
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UNITED STATES SENATE

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## INTRODUCTION AND STRATEGIC ENVIRONMENT

Chairman Duckworth, Ranking Member Cotton, and distinguished members of the subcommittee, thank you for having us here today to provide testimony on U.S. Air Force modernization. Additionally, thank you for your leadership and dedication to rebuilding the United States military.

Our nation faces a complex set of current and future security challenges requiring that we think and act differently and with urgency. The American homeland is no longer a sanctuary. Our citizens face threats from a variety of actors in both the physical and digital arenas. Competitors, especially China and Russia, continue aggressive efforts to negate our long-standing warfighting advantages while challenging America's interests and geopolitical position. China in particular is the nation's pacing threat. It has rapidly become more assertive, and is the only competitor potentially capable of combining its economic, diplomatic, military, and technological power to mount a sustained challenge to a stable and open international system.

The Chief of Staff of the Air Force has articulated what is at stake with his *Accelerate Change or Lose* white paper. It states "*unless we make significant changes to the Air Force's programmed force, we will not meet the pacing threat of China in 2030. Unless something changes, we will not be able to accomplish the Air Force's core mission's in the future operating environment.*" A growing body of evidence from adversary assessments, recent wargames, exercises, studies, reports, and other analysis underpins this assessment.

To make these changes will require difficult choices. It will require taking calculated risk now to reduce existential risk in the future. When considering the missions we perform today, in the Middle East and elsewhere, it is fairly easy to calculate risk and recognize the necessary changes. However, measuring risk becomes more challenging when we look into the future, at conflict scenarios with peer competitors like China. We must consider the risk that arises if we fail to recognize the need to change. The risk to our nation of losing in those scenarios far outweighs the calculated risks we are willing to take today to accelerate change.

The mission of the U.S. Air Force is to *fly, fight, and win...Airpower anytime, anywhere*. Military airpower is global, agile, flexible, rapid, and when necessary, highly destructive. The Air Force was created to realize the potential of military airpower to defend the United States, our citizens, and our friends. We know our potential adversaries respect—even fear—U.S. airpower, as they devote extreme amounts of money, time, and manpower to defend against it.

We also know they are fielding capabilities to attack the U.S. and our allies through the air. In this, they hope to hold our territory, bases, and citizens hostage, making us vulnerable to coercion. Both of these conditions are not new. They existed after World War II and provided the impetus to create the Air Force in 1947. In 2021, we must remember this “why” behind the Air Force as we look to the future. We can make the changes necessary to sustain and strengthen the U.S. advantage in airpower, but to do so, we must concentrate on the core reasons we exist.

The U.S. Air Force has five core missions: air superiority; intelligence, surveillance, and reconnaissance (ISR); command and control; global strike; and global mobility. These core missions represent what the nation expects of the U.S. Air Force, and they are part of our heritage; however, our continued ability to provide these core missions in defense of the nation is not guaranteed. The Air Force must change, because our environment is changing and our competitors are closing in. For too long, we have mitigated short-term risk at the expense of long-term, and we must correct this imbalance.

Since the publication of the National Defense Strategy (NDS) in 2018, the Air Force has worked tirelessly to identify new ways of approaching our toughest challenges in a peer fight, to include careful assessments of current and future risks. But our work is far from over. We look forward to continued engagement on the Air Force’s future force design with this subcommittee and all of our stakeholders. It is the only way to ensure we are building a relevant and ready force for the future. This year’s budget request will be another step in that journey.

## **AIR FORCE IN DEMAND**

### **Global Force Management**

Through Joint Staff-led Global Force Management (GFM) processes, the Air Force attempts to optimize force capabilities for operations against peer competitors, fulfill Combatant Commander requirements, and provide stability to the Total Force. The Air Force also actively works GFM issues through the Joint Staff as the Department of Defense’s (DoD) global command-and-control mechanism to adjust distribution of forces, and to conduct global force strategic planning.

During Fiscal Year 2021 (FY21), as in years past, the Air Force was employed in unique and disparate locations across the globe at all levels of conflict. Our limited supply of capability will never satisfy global joint force demand for air power. Through GFM, the Air Force worked

hard to balance risk with supply and demand, and to optimize our unique global flexibility to rapidly deploy with scalable, tailorable forces to all Combatant Commanders.

The Air Force is the nation's "9-1-1" force. The preponderance of our Total Force is required within the opening days of any conflict. We have repeatedly demonstrated our ability to employ air power within hours, any day, to any point on the globe at the speed of relevance. Looking forward into FY22 and beyond, the Air Force will continue to refine our equities and contributions within GFM processes, maturing concepts such as Dynamic Force Employment (DFE) and Agile Combat Employment (ACE), and through the utilization of our new force presentation model, Air Force Force Generation (AFFORGEN). Through these initiatives, the Air Force is postured to regain Total Force readiness, meet strategic guidance, enable modernization, and balance current operations with future capability requirements.

### **Dynamic Force Employment**

The 2018 NDS introduced the concept of Dynamic Force Employment (DFE) as a Secretary of Defense resource to provide options for proactive and scalable employment of the Joint Force to compete, deter, and win in great power competition. Since FY19, the Air Force has leveraged DFE as a more effective means of using air power for strategic effect, while recovering and building peer adversary readiness in accordance with the NDS. For FY21, the Air Force has conducted multiple DFEs and will execute several more before the end of the year.

Through the application of DFE within GFM processes, the DoD can proactively shape the strategic environment, while modernizing, testing, and gaining readiness to both respond to contingencies and ensure the long-term viability of the Joint Force. DFE is a better utilization of air power to rapidly meet Combatant Command requirements and assure allies and partners versus the traditional readiness-consuming heel-to-toe rotational presence.

Air power's inherently dynamic, agile, and strategic attributes enhance DFE effects to expand competitive space beyond regularized patterns while providing maximum responsiveness to emergent priority missions. DFE is also a valuable resource for the Air Force to explore, experiment, and refine rapid employment concepts such as ACE and the Bomber Task Force (BTF) to advance air power's global "enhanced maneuver" effectiveness and resiliency. For all these reasons, we continue to receive more requests for DFE than we can satisfy. This will continue forward in FY22, and highlights the importance of adhering to national strategy, the

GFM process, and successful fielding of AFFORGEN to maintain a sustainable ready Air Force that can compete and overmatch peer adversaries.

### **Agile Combat Employment**

The U.S. Air Force continues to develop and refine the ACE concept. ACE is the ability to quickly disperse and cluster forces to a cooperative security location and conduct operations across all domains, while maintaining operational flexibility. This operating method will allow the U.S. to present our adversaries with multiple dilemmas during both the day-to-day competition and potential future conflict. The ability of ACE to sustain combat operations using advanced, agile, and adaptive logistics is being validated through multiple exercises worldwide. Earlier this year, Airmen from Lakenheath Air Base, United Kingdom, exercised this concept as part of the Exercise Baltic Trident. This exercise showcased ACE concepts such as multi-capable Airmen, interoperability with allies and partners, smaller manpower footprints, and a reduction in the reliance on prepared airfields. Future investments in both U.S. and allied airfield infrastructure, combined with rapidly deployable support, will be necessary to ensure ACE viability as the concept matures. Planned FY22 military construction investment in both European and Pacific theaters support further development of the ACE concept.

### **AIR FORCE WE NEED (READINESS)**

Our readiness is a combination of the capacity, availability, and capability of the force to meet the tasks required of the nation as detailed in the NDS. In spite of COVID-19, our current force readiness has remained flat over the last two-years; however, we have seen modest increases in readiness for our “fight tonight” units over the same period. Today’s readiness is undermined by three main factors: 1) our force is too small to meet current demand; 2) our fleets are too old and in some cases only relevant for today’s needs; and 3) our training infrastructure is outdated.

Over past decades, readiness has become synonymous with “availability” and “capacity,” which are largely measures of military units available for immediate deployment and ready to “fight tonight,” while “capability” took on a lesser role. In order to be ready and relevant for the great power competition ahead, we must transform the force and its training infrastructure to provide the capabilities the NDS demands. We must balance the risk and demands of the current environment with the need to arrive in the future with the capacity and capability we need.

As we transition to the force we need, it is essential to modernize and eliminate costly and less-capable legacy systems. This will lower operating costs, improve availability, and provide essential capabilities to present a combat-credible and ready force to meet the demands of great power competition.

### **Operational Test & Training Infrastructure**

We know from both experience and experimentation that combat crews increase lethality and reduce attrition when they train against the actual or representative threats they will encounter in combat. Therefore, we are fully committed to advancing and modernizing our live and synthetic programs to provide relevant and realistic training for tomorrow's force. Ready and relevant requires improvements to training in both the live and synthetic domains. The live domain includes required airspace and ranges, modernizing the replication of current and future adversarial threats, as well as real-time data processing and control and evaluation of combat training engagements. The synthetic domain requires the creation of a common synthetic environment that provides all users the authoritative data for threats, terrain, weather, and friendly forces for high value simulator training against peer threats.

In the live domain, our range priority remains our two largest ranges, the Nevada Test and Training Range (NTTR) and the Joint Pacific-Alaska Range Complex (JPARC). We will upgrade the threat replication of both of these ranges to Level 4 (near-peer) capabilities. With current and programmed funding, NTTR and JPARC are projected to achieve Level 4 in FY30 and FY32, respectively. The Air Force is evaluating options to accelerate these upgrades. In addition, we intend to upgrade six Primary Training Ranges, both CONUS and OCONUS, to a Level 3 capability by FY33.

Our range modernization approach also addresses the encryption and movement of data to improve the realism of our training events. We will procure the Navy's Tactical Combat Training System II (TCTS-II) to modernize our Combat Training System (CTS) requirement. In addition to addressing the pending obsolescence of our P5 Combat Training System pod, this will provide an ability to share encrypted data for training. This will allow our 4th and 5th generation, and eventually 6th generation platforms, to train together in a manner is not achievable with current technology. Concurrently, we are pursuing a Live Mission Operational Capability (LMOC) to standardize and modernize our training ranges. In addition to eliminating

manpower intensive processes, this capability allows us to tie legacy threat systems together to create a more realistic adversary Integrated Air Defense System.

Our range modernization approach will ensure our live ranges provide both realistic and relevant training environments to our future force. Moving forward, live training will always be the cornerstone of Air Force readiness; however, the live training environment is constrained by the geographic limitations and technological improvements of both our and our future adversaries' capabilities. This mandates a shift in portions of our combat training to the synthetic training environment to allow aircrew members to fully use their capabilities and effectively practice the tactics, techniques, and procedures they will employ against future adversaries.

This shift of advanced training to the synthetic arena requires us to replace disparate, legacy synthetic environments with a common synthetic training environment. Development of this environment will provide a Level 4 (near peer) training capability for all operational units while allowing our advanced platforms to exercise capabilities they cannot use in a live environment. This synthetic environment will be the only arena in which Air Force, Joint, and Coalition units can train together using their full capabilities in realistic scenarios.

We are confident these tailored improvements to our live and synthetic training capabilities will provide our crews with the ability to maximize the lethality advantage of current and future weapon systems.

### **Pilot Production**

The Air Force remains focused on improving the overall pilot inventory within the active duty, Air National Guard, and Air Force Reserve. Today we are still short approximately 1,900 pilots. Over half of that shortfall is in the Air Reserve Components. In the Regular Air Force, our shortfall resides in our younger pilot ranks due to 10-years of under-production. In order to match pilot requirements with production we must sustainably produce 1,500 pilots per year. At this rate we can properly train, absorb, and manage each production year. Substantial short-term increases in production to improve the overall inventory sooner are not manageable. We must expand production quickly to 1,500 and then maintain it for the foreseeable future.

We have spent the last two years developing ways to expand production with our existing five-base production plant. We are instituting and testing a number of initiatives that will expand our annual production capacity to at least 1,500 pilots by 2023. These initiatives include

modernizing pilot training to improve the quality of new pilots for the challenges of advanced 5th generation aviation, streamlining the helicopter pilot production path, adjusting the training program for those candidates with extensive civil aviation experience or completion of accredited aviation programs, improving simulator instructor recruitment and retention, and evaluating a remote simulator instruction concept. In all of these instances we leverage technology to improve the training experience, conduct training earlier, and augment our proven production methods. In all cases, the quality of our graduates remains critical to our long-term success and readiness. As we expand production we will not sacrifice the quality within our pilot production enterprise.

### **Air Force Force Generation**

The Air Force is transitioning to a new AFFORGEN model that provides the Joint Force with a sustainable high-end Air Force ready for peer competition and major combat operations in accordance with the NDS. Due to air power's inherent flexibility, our previous generation models could not easily define sustainable capacity and capability limits, nor could it easily facilitate modernization towards rapid force employment concepts to develop future force readiness. As a result, over the past 20+ years, the Air Force has been "all in" at the expense of readiness and modernization. While we knew this was happening, the Air Force lacked the ability to present an easily understood model that reflected all facets of airpower that could communicate how the Air Force was being consumed faster than it could rebuild readiness.

To address these issues, and to get after the heart of General Brown's *Accelerate Change or Lose* initiatives, AFFORGEN has become the Service catalyst for a paradigm and cultural shift in how we prepare and present credible and capable air power. Aligning to the notion that we can no longer sacrifice future readiness for the sake of "right now," AFFORGEN provides the Service with a standardized, easy to understand, and defensible model that builds readiness over time and clearly predicts the impact of GFM actions to future force offerings, readiness, and modernization. AFFORGEN also balances tradeoffs between short-term and longer-term force elements of equipment readiness such as depot modernization, stabilizes manning to avoid abrupt readiness declines in training, resources units to sustain higher-levels of readiness over longer periods of time, provides leadership with greater unit training and readiness forecasting, and better informs corporate resourcing and budgeting decisions.



Institutionalizing AFFORGEN will take leadership at all levels. Through GFM processes, we have begun the hard work today, setting conditions to establish Initial Operational Capability (IOC) in FY23, maturing through FY24 and FY25.

## **CURRENT CAPACITY AND CAPABILITY**

Following NDS and National Security Strategy guidance, the Air Force seeks to invest in technologies and field systems that are both lethal and survivable against a peer threat. This ultimately means transitioning away from many legacy platforms in order to free up manpower as resources to field more capable systems and modernize. If we are to modernize to address the emerging threat, we must use resources tied to our legacy platforms and weapons systems that are decreasing in relevance today and will be irrelevant in the future. We must strike a balance between risk in the near-term and risk in the future.

### **Bomber / ICBM Force Structure**

The future of our bomber force relies on the B-21 and a heavily-modified B-52. Our budget proposal supports the Defense Department's principal priority to maintain a safe, secure, and effective nuclear deterrent that safeguards the homeland, assures allies, and deters adversaries. Nuclear deterrence is the highest priority mission of the Department of Defense – our deterrent underwrites every U.S. military operation around the world and is the foundation and backstop of our national defense.

#### ***B-21***

The B-21 Raider will form the backbone of our future bomber force. The B-21 will have the range, access, and payload to penetrate the most highly contested threat environments to hold any target on the globe at risk. The B-21 will provide the capabilities to deter and, if needed, win in high-end, near-peer conflicts. Not only will the B-21 underscore our national security as the most flexible leg of the Nuclear Triad, it will also support Combatant Commanders across the range of military objectives as both a nuclear and conventional bomber. In under three years, the B-21 has transitioned from a digital design to two test aircraft being manufactured on the production line. The FY22 President's Budget (\$2.87 billion) continues to fund the production of test aircraft and supports scaling the manufacturing infrastructure and capacity across the supply base. In addition, the budget also includes \$108 million to procure initial long-lead parts in advance of low rate initial production.

In parallel, beddown preparations at Ellsworth Air Force Base (AFB), South Dakota remain on-track. The FY22 President's Budget requests \$343 million to begin construction of six projects at Ellsworth AFB. The first B-21s are projected to arrive at Ellsworth AFB in the mid-2020s with base infrastructure ready to support. A second Environmental Impact Statement is expected to begin in 2022 to assess the final two basing locations, Dyess AFB, Texas and Whiteman AFB, Missouri.

The FY21 NDAA required the Air Force to preserve minimum Primary Mission Aircraft Inventory levels with a path to a 225 bomber fleet. Our preferred end state is a two bomber fleet compromised of 225 modernized, relevant, and healthy B-21 and B-52 aircraft. The Air Force is committed and on track to meet its key performance parameter of building B-21s with an average procurement unit cost of \$550 million (Base Year 2010) / \$639 million (Base Year 2019), assuming a minimum fleet of 100 aircraft.

### ***B-52***

While the last B-52 Stratofortress entered service in the U.S. Air Force in 1962, we expect to continue operating the B-52 through 2050. We will continue to invest in modernization programs to keep the platform operationally relevant. Major modernization efforts include the Commercial Engine Replacement Program (CERP), Radar Modernization Program, Combat Network Communications Technology (CONNECT), and installation of Advanced Extremely High Frequency (AEHF) secured satellite communication capabilities.

The Air Force's number one priority for the B-52 is to ensure platform viability through 2050 and the CERP is critical to achieving this goal. CERP will replace legacy engines (TF33-PW-103) with new commercial engines using Middle Tier of Acquisition processes to remove more than three years from the traditional program schedule. Additionally, CERP is more complex than just a standard commercial engine refit. CERP includes new engines, flight systems, and cockpit throttle and displays. The Radar Modernization Program is also necessary to ensure viability through 2050 and will modernize the current Strategic Radar (AN/APQ-166), which is based on 1960s technology modified in the 1980s.

B-52 Combat Network Communications Technology (CONNECT) fleet modification will be complete in FY23. This system provides an integrated communication and mission management system, as well as a machine-to-machine interface for conventional weapons retargeting. CONNECT's digital infrastructure and architecture is the foundation for the 1760

Internal Weapons Bay Upgrade, which allows for internal carriage of J-series weapons through modification of the Common Strategic Rotary Launchers. This significantly increases the B-52's capability to store and deliver the Joint Direct Attack Munition (JDAM), Laser-JDAM, Joint Air-to-Surface Standoff Missile (JASSM) and its extended range variant, and the Miniature Air Launched Decoy (MALD) along with its jamming variant. Finally, the integration of the long-range standoff (LRSO) nuclear air-launched cruise missile and AEHF will ensure the continuation of the B-52's role in the airborne leg of the Nuclear Triad. The Air Force remains committed to B-52 modernization to ensure the nation's oldest and most versatile frontline long range bomber remains relevant through 2050 and beyond.

### ***B-1***

The B-1 is a long-range, supersonic multirole bomber capable of flying intercontinental missions with the largest payload of guided and unguided weapons in the Air Force inventory. In FY21 we are retiring 17 B-1s as authorized in the FY21 NDAA. This will allow the Air Force to focus available resources on sustaining and modernizing the remaining combat-coded B-1s. The goal is to retire the most challenging aircraft to sustain in order to improve readiness of the remaining fleet. We will ensure the B-1s remain lethal and viable until B-21s are operational in sufficient numbers. The recently completed Integrated Battle Station upgrade enhances crew situational awareness and precision engagement capabilities and is the B-1's largest modernization effort ever. The first aircraft with this upgrade was delivered in January 2014 and the last aircraft was completed in September 2020. Other efforts to update the B-1's communication systems are ongoing and ensure the B-1 remains the backbone of the Air Force's long-range bomber force until the B-21 arrives.

Lastly, the B-1 is the Air Force's threshold platform for the Long Range Anti-Ship Missile (LRASM). Integration of this weapon, coupled with the B-1's long range, high speed, and large payload capacity, postures the B-1 for an important role in any conflict in the Indo-Pacific region.

### ***B-2***

The B-2 is the only long-range strike aircraft capable of penetrating and surviving advanced Integrated Air Defense Systems to deliver weapons against heavily defended targets. Its unique attributes of intercontinental range, precision strike, large conventional or nuclear payloads, ability to penetrate defenses, and low observable profile allow it to execute Nuclear

Deterrence Operations, Nuclear Response, Global Strike, and Global Precision Attack missions. The Air Force will ensure the B-2 remains effective until the B-21 is operational. Because delays in the Defensive Management System modernization effort would limit the operational utility of the system by the time it would be fielded, the Air Force abandoned full Defensive Management System modernization. Instead, we are replacing the B-2's unsustainable cathode ray tube displays with modern sustainable displays.

The Air Force completed development efforts to re-host the Stores Management Operational Flight Program software in the Flexible Strike program. This enables the B-2 to take advantage of advanced digital weapon interfaces, such as those used by the B61-12 nuclear weapon. The Flexible Strike capability reached Initial Operational Capability in November 2020 as part of the B-2 P6.2 block effort, which includes Military GPS User Equipment and B-2 hardware to support carrying the B61-12 weapon. The Air Force completed fleet-wide installation of the Common Very-Low-Frequency/Low Frequency (VLF/LF) Receiver, providing the B-2 with a VLF/LF receiver for secure, survivable, strategic communications. Other on-going B-2 modernization programs include Adaptive Communication Suite upgrades, enhancement of the Identification Friend or Foe (IFF) system, replacement of the Crash Survivable Memory Unit, integration of hardware upgrades for employment of the B61-12 nuclear weapon, and software upgrades to allow the B-2 to carry the extended range variant of the Joint Air-to-Surface Standoff Missile (JASSM-ER). Development of the Radar Aided Targeting System software upgrade began in October 2018 and will provide improved navigational handoff to weapons in a GPS-denied environment. Finally, the B-2 will continue sustainment efforts for the on-going Low Observable Signature and Supportability Modification effort to improve aircraft maintainability and availability.

### **Intercontinental Ballistic Missile Modernization**

Intercontinental Ballistic Missiles (ICBMs) are integral to U.S. nuclear deterrence. The Air Force is in the initial stages of replacing this 1970s-era ICBM capability with the Ground-Based Strategic Deterrent (GBSD). The GBSD is the most cost effective option for modernizing the ICBM leg of the Nuclear Triad and supports the NDS to modernize the capability of nuclear forces. The GBSD will extend and improve the capabilities of the ground-based leg of the Nuclear Triad, providing a credible and responsive deterrent capability against current and emerging adversaries through 2075. The new weapon system will provide improved nuclear

surety, safety, and effectiveness with enhanced security features as well as technologies that cannot be incorporated into the existing Minuteman-III system. Furthermore, attempting to keep the Minuteman-III through a Service Life Extension Program (SLEP) is not a cost-effective option. GBSD will provide more efficient operations, maintenance, and security by modernizing critical infrastructure and decreasing lifecycle costs.

The GBSD program remains on track in pursuing a low risk, technically mature design and is using innovative digital engineering and acquisition strategies to increase development speed and ensure on-time delivery. Deployment is scheduled to begin in the late-2020s in order to resolve capability, attrition, and age-out concerns with the Minuteman-III weapon system, as well as meet warfighter requirements. The nation is focusing investment on these new missiles and the associated infrastructure and accompanying re-entry systems.

### **Fighter Force Structure**

The Air Force must accelerate change to its fighter force structure to meet the threat posed by China and Russia, ensuring the Air Force can achieve air superiority and dominance over peer adversaries and has the capacity to meet world-wide demands in the 2030s and beyond. Extensive gaming and analysis using the most difficult problem (i.e., China) and the most difficult scenario (i.e., Taiwan) at the most difficult time (i.e., 2035), shows that the Air Force must change the future fighter force structure mix by changing investment priorities to provide the capability, capacity, and affordability required to meet the peer threat. To just keep pace with the threat would require an additional \$6 billion to \$7 billion per year to modernize our current force projected into the future. Even if that was affordable, this force would fall well short of the capability required to counter a future peer threat. Modernization programs cannot transform our 4th generation fighters into 5th generation fighters, or 5th generation fighters into next Generation Air Dominance (NGAD).

Our fighters are becoming significantly more expensive to sustain as they age, and ours are the most aged of all. The average age of the Air Force fleet is 28.6 years, while the U.S. Navy is 14.4 years and the U.S. Army is 15.3 years. In comparison to our allies, the average age of the Royal Australian Air Force (RAAF) is 8.9 years and the Royal Air Force (United Kingdom) is 16.5 years. Weapons System Sustainment (WSS) costs have increased 130 percent over the last 20 years, even with a 15 percent decrease in total aircraft inventory (TAI). We need

new platforms and weapons to replace an aging force, but also must invest in cutting edge technology needed to confront and pace peer threats.

In realistic budget projections, we must balance the need for high end technology with affordable capacity. To attain this desired fighter fleet, the Air Force must right size current aircraft inventories to expedite the transition away from less capable, aging aircraft and emphasize investment in future capabilities such as NGAD and F-35 modernization. The desired Air Force fighter fleet should match capability and capacity of both platforms and weapons to mission requirements. As part of its force structure change, the Air Force must transition its fighter fleet from seven platforms (i.e., F-35, F-22, F-16, F-15EX, F-15E, F-15C, A-10) to four platforms (i.e., NGAD, F-35, F-15EX, F-16) plus the A-10 in the near- to mid-term.

#### ***Next Generation Air Dominance (NGAD)***

The Air Force is investing in technologies as part of a family of capabilities to assure air dominance in the future. NGAD is an advanced, air superiority fighter designed to operate within the most challenging operational environments and replace the aging F-22. The requirement to establish and maintain air superiority within the battlespace cannot be understated as it underpins the joint force operations in any theater. NGAD is our program that supports studies, analyses, technical maturation, and prototyping activities leading to enhancements in lethality, survivability, interoperability, and persistence to ensure air superiority. The FY22 President's budget requests \$1.5 billion in FY22 to fund the continued development of a next generation open mission system architecture, advanced sensors, cutting-edge communications using open standards, and integration of the most promising technologies into the family of capabilities. Furthermore, this program incorporates novel agile acquisition practices through its competitive industry consortium approach that is yielding favorable results and provides greater value for the taxpayer. Our efforts are being shaped by multiple analyses, including recommendations from the Chief of Staff of the Air Force approved Air Superiority 2030 Flight Plan, recently completed NGAD Analysis of Alternatives, and several others from renowned analytic organizations. Continued investment in NGAD technologies is critical to ensuring continued air dominance within emerging threat environments for all future joint operations.

#### ***F-35***

The F-35 is the cornerstone of our future fighter fleet. The F-35 today is dominant, purpose built, and equipped with advanced weapons for the contested environment. The original

program of record was designed to replace all F-16s and all A-10s. Whether the Air Force is able to afford to replace the majority of the fighter fleet with F-35s is a decision-point that is still a few years away. In the near-term, we must concentrate on achieving the F-35 capability needed for advanced threats. While the F-35 is a formidable platform today, it faces challenges to ensure it stays dominant against an evolving future threat. To keep pace with the threat in future contested scenarios, follow-on modernization efforts centered on “Block 4” enabled by Technical Refresh 3 (TR-3) hardware must be affordably realized on competition-relevant timelines. The F-35 operating costs (as currently projected) and long-term sustainment costs are areas of concern that need continued focus and work to address affordability.

The FY22 President’s budget request decreases the F-35 procurement quantity in FY22 to 48 from the FY21 enacted position of 60 aircraft and commits \$5.09 billion to procurement, \$985.4 million to development and \$704.5 million to fund necessary sustainment, capability development, and retrofit cost gaps. Block 4/TR-3 provides the capabilities we need to address future threats and maintain advantage. Procuring additional aircraft before Block 4/TR-3 “cuts in” to production will drive a retrofit bill and is therefore not desired.

### ***F-22***

The F-22 is the only operational multi-mission air superiority fighter aircraft that combines stealth, supercruise, maneuverability, and integrated avionics to make it the world’s most capable air superiority aircraft. The FY22 President’s budget request includes \$1.1 billion in FY22 for modernization efforts essential to gain and maintain air superiority against evolving threats. The Capability Pipeline, an agile acquisition construct, combines former TackLink16, Tactical Mandates (TACMAN), and GPS M-code programs to deliver slices of each capability on a regular release cadence to the field. Future modernizations will continue to leverage the “Capability Pipeline” as a vehicle to rapidly prototype and iteratively field critical enhancements with capabilities delivered to the fleet in order to ensure “first look, first shot, first kill” capability in highly contested environments. The transition timeline from F-22 to NGAD is dependent on the progress of NGAD development efforts.

### ***F-15***

The F-15C/D supports both Homeland Defense and the air superiority mission. Our F-15C fleet is aging, with two-thirds of the fleet past its designed service life. The 234 F-15C/Ds in the Air Force inventory will reach the end of their design service life in the next six to eight

years, and our analysis shows additional service life extension programs are not cost effective. The FY22 President's budget request divests 48 F-15C/Ds from the active fleet. We have already started to replace this fleet with a modernized successor by purchasing the F-15EX. The F-15EX "Eagle II" will provide superior sensor, range, and payload for Critical Infrastructure Defense. The Eagle II additionally brings outsized long range weapons (i.e., air-to-surface and air-to-air) into a peer fight. The FY22 President's budget request procures 12 F-15EX aircraft at a cost of \$1.335 billion. Notably, the Air Force remains fully committed to advanced 5th and next generation capabilities and the F-35. The decision to refresh the 4th generation fighter force with the F-15EX is a complementary step to both F-35 procurement and NGAD development, and helps mitigate capacity risk while balancing near-term readiness concerns.

The existing F-15E Strike Eagle fleet provides all-weather, long range global precision attack in all but the highest threat environments. The FY22 President's budget requests \$488.7 million in FY22 to continue modernization efforts to ensure the aircraft remains viable to the 2030s. Modernizing the F-15E with Early Passive Active Warning Survivability System (EPAWSS), also used on the F-15EX, demonstrates our commitment to building a more lethal Air Force. EPAWSS will allow the F-15E/EX to survive to attack targets in high threat environments.

### ***F-16***

The F-16 is the Air Force's primary multi-role fighter and Suppression of Enemy Air Defense (SEAD) aircraft. Our more than 600 late block F-16s will provide affordable capacity for the next 15 or more years, in both competition and more permissive combat environments. We are beginning to transition away from our oldest, early block F-16s, with a reduction of 47 planned in FY22. We will continue to modernize the late block F-16s we keep as our "affordable capacity" fighter into the 2040s. The F-16 investment strategy funds modifications for the most capable, late block aircraft to ensure they can operate and survive in today's threat environment. The FY22 President's budget requests \$888.3 million in FY22 to continue these modernization efforts. This includes continuing the Service Life Extension Program comprising 12 structural modifications, affecting 300 aircraft, as well as several avionics capability upgrades including the Active Electronically Scanned Array (AESA) Radar upgrade. The new radar replaces the current mechanically scanned radar, with greater ability to detect, track, and identify low-observable, low-flying, and slow-flying targets. This joint emerging operational need is



critical for the F-16 platform to meet aerospace control alert mission requirements to properly defend the homeland against modern threats. These radars continue fielding in FY22.

### ***A-10***

The A-10 remains an effective close air support platform for the current Counter Violent Extremist Organization fight. With very limited utility in a contested fight, we are right-sizing our A-10 fleet for the current and anticipated future demand and then structurally extending and modernizing the aircraft we keep. We will continue to re-wing and modernize 218 A-10s while we reduce the fleet by 42 in FY22 and an additional 21 in FY23. The FY22 President's budget requests \$122.8 million (Procurement; and Research, Development, Test, and Evaluation funds) in FY22 for modernization. The 2016 and 2017 National Defense Authorization Acts restrict retiring or divesting A-10s until completion of the F-35 Initial Operational Test and Evaluation comparative tests and associated reports, and the Secretary of the Air Force briefs the findings to congressional committees. We are seeking legislative relief to delink the Comparative Test portion, which is complete, from the overall Initial Operational Test and Evaluation report, which is not, in order to begin right-sizing this fleet.

### **Trainers**

#### ***T-1, T-6, and T-38***

The Air Force is continuing investment efforts in its trainer platforms, including modernization programs for the T-1, T-6, and T-38 fleets. The T-1A Avionics Modernization Program will modernize the T-1A fleet and address known obsolescence and diminishing manufacturing supply issues. For the T-6, the Air Force is completing installation of Automatic Dependent Surveillance-Broadcast (ADS-B) Out, modernizing the Aircrew Training Devices and Crew System life support equipment, and providing logistics support. Additionally, research and development activities will be funded for the Next Generation On-Board Oxygen Generation System (OBOGS) to improve the safety of pilot training and address on-going physiological events in the T-6 aircraft. For the T-38C, modifications are also required to sustain and upgrade the fleet until the T-7A delivers, including avionics, Pacer Classic III, Talon repair, inspections, maintenance, and front canopy replacement programs until the eT-7A is delivered. The FY22 President's budget requests \$3.9 million, \$8.8 million, and \$54.3 million for the T-1, T-6, and T-38 fleets, respectively.

## ***eT-7A***

The Advanced Pilot Trainer (*eT-7A*) contract was awarded to The Boeing Company on 27 September 2018. The *eT-7A* System Critical Design Review was completed in the summer of 2020. The *eT-7A* replaces the Air Education and Training Command's existing fleet of 427 T-38C aircraft with 351 aircraft and associated simulators, ground equipment, spares, and support equipment. The *eT-7A* will provide student pilots with the skills and competencies required to be better prepared to transition into 4th and 5th generation fighter and bomber aircraft. The FY22 President's budget request of \$199.3 million continues the program's Engineering and Manufacturing Development and early aircraft flight test efforts, as well as procures long lead support equipment, ensuring we meet the 2024 Initial Operational Capability and 2034 Full Operational Capability milestones.

## **Munitions**

The Air Force must maintain a suite of affordable air-to-air and air-to-ground kinetic and non-kinetic weapons delivering capability and capacity to defeat rapidly evolving peer competitors. As such, we continue to procure preferred munitions, but are tapering production as programs approach warfighter inventory objectives, while simultaneously investing in new technology to counter future peer threats in highly contested environments. During the last several years, we have successfully ramped up production capacity across the portfolio and our FY22 President's budget request reduces procurement rates of preferred munitions to sustain inventory objectives, while continuing to provide resources to apply toward advanced weaponry and hypersonics. We will continue to invest in future weapon design, development, and fielding to ensure advanced capabilities are available to engage all future threats. To ensure success, munitions procurement will remain an item of interest across the FYDP.

## ***Joint Direct Attack Munition and Small Diameter Bomb***

The Joint Direct Attack Munition (JDAM) is the air-to-ground weapon of choice in the current fight and the expenditure rate has reduced by 42 percent in FY21 (840) compared to FY20 (1,443). After increasing tailkit production to 45,000 tailkits per year in FY18 to meet the needs of the Services and Foreign Military Sales (FMS) partners, the Air Force has adjusted to demand and now plans to procure 1,900 tailkits in FY22 with a request of \$124 million, with Navy and FMS partners procuring the remaining production capacity.

Small Diameter Bomb I (SDB I) and II (SDB II) provide reduced collateral damage effects and increased load-out per sortie for our warfighters. Due to its high operational utility, the Air Force ramped the line for SDB I from 3,000 weapons per year in FY15 to 8,000 weapons in FY17. With demand dropping and advanced standoff weapons in higher demand, the FY22 President's budget requests \$82.8 million and plans to order 998 weapons leaving residual production capacity available to FMS partners. For SDB II, the FY22 President's budget requests \$294.6 million to procure 985 weapons.

Finally, Hellfire missiles provide a time-sensitive, direct strike capability for our remotely-piloted aircraft and remain in high demand around the world. Production capacity, shared between Hellfire and Joint Air-to-Ground Missile (JAGM), was ramped up from 5,000 missiles per year in FY15 to 11,000 missiles per year in FY19. With lower demand and higher priority advanced weapons requirements, the FY22 President's budget requests \$104 million and procures at least 1,274 Hellfire missiles.

***Joint Air-to-Surface Standoff Missile and Advanced Medium Range Air-to-Air Missile***

As the Air Force responds to current operational demands, we are also looking to the future to ensure we are prepared to defend against more advanced threats as directed in the NDS. Doing so requires advanced weapons capabilities and the FY22 President's budget request reflects the Air Force's plan to continue investing in those areas, specifically with the Joint Air-to-Surface Standoff Missile (JASSM), the Long-Range Anti-Ship Munition (LRASM), and the Advanced Medium Range Air-to-Air Missile (AMRAAM). These weapons provide unique and necessary capabilities for the highly contested environment.

JASSM is the premier air-to-ground, low observable missile for defeating threats in highly contested environments and is the weapon of choice for a future fight against peer adversaries. The program is focused on increasing inventory by implementing a strategy to ramp up production rates and monitor subsystems for obsolescence. To achieve this, we have partnered with industry to expand production capacity to satisfy a 47 percent increase in our inventory objective. The FY22 President's budget requests \$711 million, with the corresponding available max rate for JASSM increasing to 525.

LRASM, produced in the same facility as JASSM, is a purpose-built anti-ship missile particularly critical for the future fight in a maritime environment. The FY22 President's budget

does not request procurement due to a supply chain obsolescence limitation. Future procurement has mitigated the limitation.

Production of AMRAAM missiles, a critical air dominance weapon, remains consistent with FY22 procurement levels by requesting \$214 million for 168 missiles, as industry partners begin to cut-in a solution to obsolescence issues through the Form Fit Function Refresh (F3R) effort.

### ***Stand-In Attack Weapon (SiAW)***

To defend the nation in an increasingly competitive global environment, we must look beyond currently fielded weapons systems and invest in future advanced munitions capabilities. To that end, the Air Force continues to invest in development of the Stand-In Attack Weapon (SiAW) to deliver a strike capability to defeat rapidly relocatable targets, a hallmark of the highly contested environment. SiAW is the munition that gives the F-35 unique air-to-surface capabilities in the high end fight for the entire Joint Force. The FY22 President's budget requests \$166.5 million for SiAW development and prototyping.

### ***Hypersonics***

The Air Force is poised to field the first production hypersonic munition in the DoD. The AGM-183 Air-Launched Rapid Response Weapon (ARRW) is completing test and begins procurement with budget requests of \$160.8 million for 12 munitions in FY22 and \$238 million for research and development. Capable of employment from fighters as well as bombers, the Air Force is also developing the Hypersonic Attack Cruise Missile (HACM) to complement ARRW. The FY22 President's budget request of \$200 million for HACM development is designed to result in production article procurement in late FY26.

### **Tanker Fleet**

Tankers are not only the lifeblood of our Joint force's ability to respond to crises and contingencies quickly, but are also essential to keeping our Air Force fueled as a global force. By the end of FY22, the tanker fleet will be comprised of 376 KC-135s, 36 KC-10s, and 74 KC-46s that execute rapid U.S. global operations. As of May 2021, we have accepted 45 KC-46 Pegasus aircraft and will receive a total of 179 KC-46s. As we transition away from the aging KC-10 and right-size the KC-135 fleet, we continue to look towards the next generation for tanker recapitalization options.

## ***KC-46***

While we continue to sustain the current tanker capability, building the future tanker fleet remains one of the Air Force's top acquisition priorities. The KC-46 will deliver greater operational readiness, flexibility, and survivability to the Global Reach mission. The Air Force awarded Lot 6 on 13 January 2021 and Lot 7 on 20 January 2021, increasing the number of production aircraft on contract to 94. The Lot 8 contract for up to 15 aircraft is projected to award in the second quarter of FY22.

The first KC-46 aircraft delivered to McConnell AFB, Kansas (Main Operating Base 1), on 25 January 2019. The Formal Training Unit at Altus AFB, Oklahoma, received its first KC-46 on 8 February 2019. The Air Force established Main Operating Base 2 at Pease Air National Guard Base, New Hampshire, on 8 August 2019, and Main Operating Base 3 at Seymour Johnson AFB, North Carolina, on 12 June 2020. Main Operating Base 4a at Joint Base McGuire-Dix-Lakehurst is planned to receive its first KC-46 in the first quarter of FY22. The Air Force will continue taking delivery of KC-46s at a rate of approximately 1.4 per month.

The Air Force remains committed to ensuring Boeing corrects deficiencies identified in both developmental and operational test and evaluation of the KC-46's effectiveness, suitability, and mission capability. Partnered with Air Mobility Command, we have worked hard to accept the KC-46 while ensuring its major deficiencies—the Remote Vision System (RVS) and stiff air refueling boom—are properly addressed without undue burden on taxpayers or warfighters. On 2 April 2020, we reached agreement with Boeing to fix the RVS deficiencies through significant upgrades, known as RVS 2.0, at no additional cost to the government. The air refueling boom engineering change proposal, initially awarded in August 2019, was definitized on 30 September 2020. The RVS design solution is expected by the end of FY23, and the stiff air refueling boom design solution is expected at the beginning of FY24. The retrofits and installs for both RVS and the boom across our fleet will begin in the first quarter of FY24. The Director, Operational Test and Evaluation (DOT&E) has stated Initial Operational Test and Evaluation (IOT&E) will conclude after the RVS and boom deficiencies are resolved; IOT&E is expected to complete in FY24. Additionally, we delayed the full-rate production decision until after IOT&E is complete and we are in receipt of the statutorily-required Beyond Low Rate Initial Production report from DOT&E.

Despite its current deficiencies, the KC-46 is safe to operate (adhering to flight manual cautions provided to our operators) and will be the Air Force's best tanker for contested environments due to enhanced situational awareness, battle management, and threat countermeasures. By accepting the KC-46 with known deficiencies, the Air Force was able to initiate familiarization and operational test activities while working with Boeing on long-term efforts to correct deficiencies. Accepting the KC-46, and fixing deficiencies in parallel with operational test and evaluation, is the fastest way to achieve full operational capability to meet warfighter requirements. Air Mobility Command is making the KC-46 available for limited operational taskings to alleviate pressure on legacy tanker fleets and allow some legacy tanker retirements.

The FY22 President's budget requests \$73.4 million in RDT&E funding for the ongoing KC-46 Engineering and Manufacturing Development and post production modification efforts, to include the boom telescope actuator redesign effort resolving the stiff boom deficiency. Additionally, the budget requests \$2.4 billion in procurement funding to award Lot 8 (14 aircraft plus associated spares, engines, support equipment, and wing air refueling pods).

#### ***KC-10 and KC-135***

The average age of our KC-135 and KC-10 tankers is 60 and 36 years old, respectively. Both fleets are challenged by aircraft parts obsolescence and diminishing manufacturing source issues. With the help of organic Air Force depots and industry, we are able to maintain these platforms as effective and safe weapon systems for the warfighter. We are executing several key modernization, safety, and compliance initiatives to ensure our KC-135 fleet remains viable beyond 2040.

The FY22 President's budget request will continue KC-135 modernization efforts including the Block 45 program, the Aero-I SATCOM program, and the Rudder Position Indicator program. To address supportability, reliability, and maintainability issues with legacy flight and engine instruments, the Block 45 program integrates a digital flight director, autopilot, radar altimeter, and electronic engine instrument display for our operators. The Aero-I SATCOM program allows the KC-135 to use Iridium SATCOM service, as the current Inmarsat service is planned to sunset in January 2023. Additionally, the Rudder Position Indicator program enhances safety of the KC-135 by providing the aircrew with situational awareness for the actual rudder position.

Additionally, the budget requests funding to keep our KC-10 fleet operational through its planned retirement, and includes funding for service bulletins and low cost modifications to ensure Federal Aviation Administration certification.

The Air Force took measured risk in FY22 tanker capacity in order to resource the capability we need for the future fight. As we look to better align the Air Force with the NDS, KC-10 and KC-135 retirements were accelerated. In FY22, the Air Force is retiring 14 KC-10s and 18 KC-135s from the Active Duty fleets.

### **Presidential Airlift**

#### ***VC-25B***

The VC-25B program will replace the U.S. Air Force Presidential VC-25A fleet, which faces capability gaps, rising maintenance costs, and parts obsolescence as it ages beyond 30 years. The VC-25B program will deliver two new aircraft to meet the requirements for the President to execute the roles of Head of State, Chief Executive, and Commander-in-Chief. Two Boeing 747-8 aircraft are being uniquely modified to provide the President, staff, and guests with safe and reliable air transportation and a level of communications capability and security equivalent to that which is available in the White House. Modifications to the 747-8 aircraft began in February 2020 in San Antonio, Texas, and include an electrical power upgrade, dual auxiliary power units that are usable in flight, mission communication systems, an executive interior, military avionics, a self-defense system, autonomous enplaning and deplaning, and autonomous baggage loading.

The FY22 President's budget requests \$681 million to continue Engineering and Manufacturing Development, aircraft modifications, and other product support activities.

### **Strategic and Tactical Airlift**

#### ***C-5***

The C-5 Super Galaxy provides all-weather worldwide strategic airlift for combat forces, equipment, and supplies, exemplifying Rapid Global Mobility as outlined in the NDS. Current investment programs focus on fleet obsolescence, maintainability, and safety of flight.

The FY22 President's budget requests \$25.4 million in procurement funding, predominately for communications, navigation, surveillance/air traffic management (CNS/ATM) and core mission computer/weather radar (CMC/WxR) system equipment. CNS/ATM upgrades include Automatic Dependent Surveillance-Broadcast (ADS-B) Out modifications required for global airspace compliance. The CMC/WxR effort replaces an antiquated radar system with

diminishing manufacturing sources and upgrades the core mission computer processor to meet the demands of future software modifications.

Additionally, the FY22 President's budget requests RDT&E funding to support replacement of the Multifunctional Control and Displays (RMCD). This comprehensive sustainment modification mitigates the obsolescence of the current control and display units and increases capacity for future technology integration into the cockpit.

### ***C-17***

The C-17 is the only aircraft in the Air Force inventory that combines tactical capability with strategic range to operate from austere airfields. The fleet of 222 aircraft provides our Nation with unmatched flexibility to conduct theater and inter-theater direct delivery, airdrop, aeromedical, and special operations airlift missions. Agile and efficient software and hardware updates ensure timely readiness, safety, and capability improvements as this premier airlift platform contributes to our national security objectives.

The FY22 President's budget requests procurement funding to continue critical modifications to the C-17 fleet. This includes a filter fire mitigation for the On-Board Inert Gas Generating System, Large Aircraft Infrared Countermeasures defensive systems, and training system upgrades. The modification effort of a replacement heads-up display will address obsolescence of the current C-17 heads-up display and improve the system's availability, reliability, and maintainability. Additionally, FY22 RDT&E funding will address obsolescence and flight safety issues. The Beyond-Line-of-Sight communication system effort modernizes multi-channel voice and data communication subsystems to ensure the C-17 keeps pace with changes in Department of Defense communication infrastructure.

### ***C-130H/J Fleet***

The C-130 fleet consists of C-130H and newer C-130J aircraft, as well as special mission aircraft (AC/LC/EC/MC/HC/WC-130s). C-130Hs and C-130Js are medium-size transport aircraft capable of completing a variety of tactical airlift operations across a broad range of missions. The fleet delivers air logistics support for all theater forces, including those involved in combat operations.

### ***C-130H***

The Air Force continues to modernize the C-130H fleet through a four-pronged approach emphasizing aircraft safety, airspace compliance, modernization, and partial recapitalization.



Our C-130H Center Wing Box replacement program breathes new life into some of our hardest flown aircraft, enabling them to continue to safely operate well into the future. The C-130H Avionics Modernization Program (AMP) Increment 1 ensures the C-130H fleet is outfitted with modern communication equipment and complies with U.S. and international airspace transponder mandates. We completed the AMP Increment 1 installations for the C-130H fleet in April 2021. The AMP Increment 2 program improves the C-130H fleet maintainability and reliability by providing a new digital avionics suite, and mitigating obsolescence and diminishing manufacturing source challenges. The FY22 President's budget requests \$9.8 million in RDT&E and \$29.8 million in procurement funding to support the C-130H fleet.

As with other weapon systems, the Air Force is taking acceptable risk in the C-130 portfolio as it focuses resources toward the future force. Specifically, in FY22 we plan to retire C-130H aircraft. Additionally, the Air Reserve Component (ARC) will be receiving five new C-130Js, resulting in a net reduction of eight aircraft.

### ***C-130J***

The Air Force has partially recapitalized the C-130H fleet with C-130Js, which also supports our Special Operations missions by providing Special Forces with extra weight carrying capacity, longer range, and better fuel efficiency. These special mission variants of the C-130J conduct airborne psychological operations and offensive electronic warfare (EC-130J), weather reconnaissance (WC-130J), search and rescue (HC-130J), and special operations (MC-130J and AC-130J). The Air Force has multiple modification efforts for the C-130J, including Center Wing Box replacement, Large Aircraft Infrared Countermeasures, and an accelerated avionics upgrade to meet 2024 Federal Aviation Administration and international airspace mandates. The C-130J Block 8.1 modernization program, currently in production, delivers new communication and data link capabilities, a modern flight management system, and other key capabilities to the field. In addition, the Air Force plans to upgrade both our C-130H and C-130J fleets with a Mobile User Objective System and a Second Generation Anti-Jam Tactical Ultra High Frequency Radio satellite communication system to ensure we maintain key communication links anywhere in the world.

The FY22 President's budget requests funding for C-130J RDT&E and \$933.8 million for C-130J procurement and modification efforts. The FY22 President's budget also requests funding for HC/MC-130J RDT&E and HC/MC-130J procurement and modification efforts.

## **Rotorcraft**

The FY22 President's budget continues investment in the Air Force's critical rotorcraft modernization programs, including the CV-22 Osprey, HH-60G, HH-60W, and MH-139A programs.

### ***CV-22***

The FY22 President's budget requests \$186 million in FY22 for the CV-22 fleet to assist in execution of the National Military Strategy by providing transformational mission capability to special operations forces warfighters. The Air Force continues to make improvements to the CV-22 with modifications designed to improve readiness, reliability, and relevance. Future efforts will make the CV-22 more cost-effective while ensuring the viability of its unique long-range payload capacity coupled with vertical take-off and landing capability.

### ***HH-60G and HH-60W (Combat Rescue Helicopter)***

The Air Force is the only Service with a dedicated force organized, trained, and equipped to execute theater-wide Personnel Recovery. The HH-60G fleet currently accomplishes this mission by conducting day, night, and marginal weather Combat Search and Rescue (CSAR) operations to recover isolated personnel in hostile or permissive environments. Due to the advancing age and current attrition rates of the HH-60G, the Air Force must continue to sustain existing HH-60G helicopters while using the Operational Loss Replacement program to meet Combatant Command requirements until we can fully recapitalize with the HH-60W (Combat Rescue Helicopter (CRH)) program. The HH-60W will be specifically equipped to conduct CSAR across the entire spectrum of military operations. The FY22 President's budget request reduces the total fleet to 105 air vehicles from the program of record of 113. The Air Force has fully funded the CRH program to meet National Military Strategy objectives through Personnel Recovery missions. The FY22 President's budget requests \$15.6 million and \$996.7 million for the HH-60G and HH-60W programs, respectively.

### ***MH-139A***

The MH-139A (formerly UH-1N Replacement) program is an element of the Air Force nuclear enterprise reform initiative and also supports operational airlift within the National Capital Region. This program will deliver up to 80 replacement helicopters, training devices, and associated support equipment to replace the legacy UH-1Ns. The FY22 President's budget requests \$16 million for the MH-139 program, which will fund the continued test and

development of the aircraft with a delay in production decision expected in FY23. The first six aircraft have been delivered and are being used to finalize test and development.

### **Intelligence, Surveillance, and Reconnaissance**

Aligned with the NDS, the Air Force is aiming to re-orient the Intelligence, Surveillance, and Reconnaissance (ISR) Enterprise by aligning ends, ways, and means to address the peer threat environment through the increased use of human-machine teaming. The end goal is a ready Next Generation ISR Enterprise possessing a decisive advantage for the warfighter while remaining competent across the entire spectrum of conflict.

To meet the challenges of a highly contested environment, the future ISR portfolio will consist of a multi-domain, multi-intelligence, collaborative sensing grid that uses advanced technology. It will be resilient, persistent, and penetrating to support both kinetic and non-kinetic capabilities alike. Global Integrated ISR must transition to connected, survivable platforms, and that requires accelerating investment and accepting short-term risks by transitioning away from outdated and underperforming ISR assets that offer limited capability against peer and near peer threats.

The FY22 President's budget request takes further steps towards repurposing, retooling, automating, and stabilizing the force to ensure the ISR Enterprise can achieve this vision within the next decade.

### ***MQ-9***

The FY22 President's budget request of \$357.9 million will continue MQ-9 fleet modernization efforts aimed at providing needed capabilities to the Combatant Commands. To date the MQ-9 fleet has flown approximately 2 million hours, with 91 percent of those hours supporting combat operations. This level of warfighter support is facilitated by a unique program architecture in which MQ-9 sustainment and modernization efforts are managed as separate, yet fully integrated and complementary, programs of record. This allows the Air Force to focus on operating and sustaining fielded MQ-9s while development and testing of planned modernizations are conducted in parallel. By structuring this way, mature and proven upgrades for the program at large are delivered when and where they are needed.

MQ-9 modernization efforts include the establishment of an MQ-9 Multi-Domain Operations (M2DO) configuration which are capability upgrades that will keep the fleet relevant. Some of the upgrades in the M2DO configuration include Anti-jam Ground Position System, C2

Resiliency, Enhanced Power, Link-16, and an effective and reliable open systems architecture. Additionally, the MQ-9 program is actively engaged in mitigating the operational and maintenance impacts of sustaining a multi-configuration fleet as well as enabling airspace integration and access.

### ***RC-135***

The Air Force is committed to sustaining and upgrading the RC-135 fleet as it continues to be our most capable, relevant, and viable signals intelligence platform. Continued modernization using rapid acquisition and fielding processes is critical as we address emerging peer threats and the return to great power competition. The RC-135 is critical to our decision advantage as it provides vital intelligence data at unrivaled speeds to both the national-level intelligence community and the tactical-level warfighter.

The FY22 President's budget request facilitates mission system improvements for the entire RC-135 variant fleet. Efforts include the automation of additional search and detection capabilities, improved near-real-time data distribution and collaborative processing, and exploitation and dissemination supported by enhanced artificial intelligence algorithms. Also, the first KC-135 to WC-135 conversion will be accomplished and delivered in FY22. Finally, our partnership with the United Kingdom's RAF on the RC-135 and the RAAF on the MC-55 Peregrine continues to set the standard for cooperative efforts that strengthen alliances while increasing partner interoperability.

### ***RQ-4***

The RQ-4 Global Hawk uncrewed aircraft system provides high altitude, long endurance, all weather, wide area reconnaissance and surveillance. The FY22 President's budget request of \$121.7 million furthers modernization and sustainment efforts, to include modernizing the ground segment, addressing diminishing manufacturing sources, and standing up and assigning a maintenance depot for RQ-4 launch and recovery elements and mission control elements.

The Ground Segment Modernization Program is on track to complete installation of upgraded cockpits at Grand Forks Air Force Base and Beale Air Force Base in FY23. Finally, the Air Force is pursuing a Secretary of Defense waiver for RQ-4 Block 30 divestment as authorized in the FY21 NDAA. The Department intends to repurpose funding in penetrating ISR capabilities.

## **FUTURE CAPABILITY**

Competing against rising peer adversaries during this time of unprecedented technology change requires a competitive acquisition system—one that is faster and more agile than our rivals. Consequently, the Air Force is transforming what we buy, how we buy, and who we buy from to retain the battlefield dominance we presently enjoy.

Understanding what to buy begins with a deep understanding of our potential adversaries and the anticipated future operating environment. We are using a future force design that incorporates adversary assessments and lessons from wargaming and other analysis to drive warfighter requirements and our acquisition choices. We will continue to incorporate our learning from these activities into future design iterations. This overall force design is being folded into our planning and programming in order to transition from the force we have to the force we need.

### **Faster Acquisitions**

Fielding systems faster is step one. Through rapid prototyping authorities granted by Congress, like Middle Tier of Acquisition, we are trimming low-value-added steps that previously bogged down programs and slowed capability to warfighters. In May 2019, we achieved our “Century Challenge” goal of removing 100 years from program schedules and we’ve just kept going toward a new goal of 150 years. By the end of FY20, we identified 83.75 years of program accelerations for MTA programs and an additional 29 years of accelerations by tailoring our traditional acquisition programs. Rapid prototyping—“flying before you buy”—is not just a faster acquisition approach; it allows risks to be tackled earlier, before systems are in production when there is still time to troubleshoot. The benefit is proving out in our MTA programs, which maintain the same documentation and discipline as traditional programs.

The Department of the Air Force is embarking on an acquisition transformation by driving a “Digital Trinity” of initiatives into our acquisition enterprise. The Digital Trinity consists of Digital Engineering, Agile Software Development, and Open Systems Architectures. These three initiatives will greatly reduce acquisition schedules, increase our access to innovative and emerging technology, reduce vendor lock, and allow us to field warfighting systems at the speed of relevance. Digital Engineering approaches will change the way we do business – shifting us from a document-based enterprise to one based in models and data, allowing us to analyze, assess, and make decisions regarding our system designs at machine enabled speeds. Agile Software Development enables us to deliver rapid, iterative improvements

to our software in an assured and secure manner. Finally, Open Systems Architecture will maximize flexibility in system design, improve access to commercial products and competition, and enable our weapon systems to be affordably and quickly modernized and upgraded.

To successfully do this, the Department must establish a digital environment, or “tech stack,” that is accessible across organizations—both industry and government—and enables our workforce to access, understand, and modify the models of our weapon systems. We must change the way we do business beyond document-based descriptions of our weapon systems toward model-based systems engineering methods that extend across the lifecycle from design to disposal. We must apply smart coding and containerization to bring functionality from the labs to the field at a rapid pace.

The Air Force is pursuing these initiatives on several fronts. First, our Air Force Digital Campaign, with over 900 participants, is drafting best practices and training, developing acquisition tools and enablers, and crafting the steps forward. The Air Force has also issued acquisition guidance for each of the three elements of the Digital Trinity. We are actively deploying acquisition enablers, software containerization and code reuse platforms, and open architectures embodied in mature Government Reference Architectures.

Finally, we have a number of trailblazing programs that are actively employing these initiatives and experiencing great results. The T-7 program, our next training aircraft, is embracing model-based engineering and 3D design tools. In doing so, Boeing reduced assembly hours by 80% and cut software development time in half. The aircraft moved from computer screen to first flight in just 36 months. Our Ground Based Strategic Deterrent (GBSD) Program analyzed over 6 billion variant designs digitally prior to making a selection. GBSD’s implementation of all elements of the Digital Trinity will enable faster design cycles, ensuring the land-based element of our nuclear triad is a deterrent for many years to come. The A-10 Enhanced Wing Assembly program demonstrates the value these principles bring to legacy platforms. Implementing digital engineering resulted in 236,500 operational hours returned to the A-10 fleet through individual aircraft maintenance assessments based on risk analysis methods pioneered by the organic A-10 government team. These tools have the ability to ensure airworthiness, safety, and affordability of the A-10 fleet into 2030 and beyond. We’re excited about the potential of these new digital practices and look forward to reaping the benefits.

### **Smarter Acquisitions**

As a key innovation engine for the Department of the Air Force, AFWERX teams Airmen and Guardians talent with commercial technology developers to transition agile, affordable, and accelerated capabilities. Per May 2020 direction from the Vice Chief of Staff of the Air Force, AFWERX 1.0 was combined with AFVentures and Agility Prime. In this arrangement we moved AFWERX under the Air Force Materiel Command, where the Air Force Research Laboratory provides the “organize, train, and equip” functions for AFWERX, while strategic direction is provided by the Service Acquisition Executive. In December 2020, SpaceWERX became part of AFWERX, and in January 2021, the Small Business Innovation Research and Small Business Technology Transfer Center of Excellence also joined AFWERX. Together AFWERX establishes technology, talent, and transition partnerships for competitive commercial advantage and military capability through the three lines of effort, AFVentures, Prime, and Spark.

“Air Force Ventures” or “AFVentures” is a key means of accelerating capability development by adjusting our work with startups, small businesses, and private investors. With over eighty percent of our nation’s research and development (R&D) now commercial—and our Defense Industrial Base continuing to shrink through mergers and acquisitions—transforming the way we work with commercial companies is imperative. In 2018, we began energizing our Small Business Innovation Research/Small Business Technology Transfer Program (SBIR/STTR) to lower barriers for commercial tech companies, speed contracts, and bring private investment into the Defense market. Since 2018, using our AFVentures process, we have awarded more than 2,000 contracts, with over 75 percent of the recipient small businesses being new to the Department of the Air Force. Those companies have gone on to raise \$2.2 billion in follow-on private capital and win \$1.4 billion non-SBIR government funding, resulting in a \$5.6-to-\$1 Return-on-Investment for the Department of the Air Force.

This Air Force Ventures process – one in which we open the door for innovative companies to propose ideas to the Department of the Air Force – showed strong value last year in being applied to non-Defense missions. Specifically, the AFVentures team was integrated into the Department of the Air Force Acquisition COVID-19 Task Force used to fight the COVID-19 pandemic, and asked to scale their operations to support FEMA, DHHS, and Joint priority missions. Over the course of 2020, the AFVentures process brought in over 3,700 pandemic-fighting ideas, 449 of which were identified to meet emerging COVID-19 related requirements –

including PPE manufacture, digital contact tracing, and remote telework. The AFVentures evaluation approach, which can scale to evaluate hundreds of proposals in a matter of weeks, was implemented by the FEMA Emergency Response team, evaluating over 300 proposals and resulting in \$645 million worth of awards. In all, the lessons learned from last year showed that the AFVentures process can be quickly implemented to solve emerging and urgent needs.

In an effort to scale the AFVentures success and accelerate transition of emerging technologies AFWERX established Prime. The first Prime program is Agility Prime. Agility Prime is a non-traditional program seeking to operationalize commercial electric vertical takeoff and landing (eVTOL) vehicles (i.e., “flying cars”) for military missions to accelerate the emerging commercial market. Agility Prime is the only all-electric passenger aircraft program in the U.S. Government. So far the program has awarded more than \$100M of contracts with close collaboration between FAA, NASA, DOT, DOE, and HHS. Agility Prime use cases include: humanitarian response, disaster relief, firefighting, distributed logistics, personnel recovery, disaster response, ship to shore delivery, and medical evacuation. The Department of the Air Force has unique testing and safety resources and military use cases to help mitigate current commercial market and regulatory risks. Agility Prime has been using these resources, rather than significant R&D funding, to attract investors, build confidence, and expedite commercialization, all while providing warfighters revolutionary flexibility with assessment across 13 different air mobility missions, some that will be tested in exercises beginning this year. Since releasing the Innovative Capabilities Opening in February 2020, 24 companies have applied. Two of those companies have made it through the Air Force airworthiness process, with several more following soon. This unlocks their opportunity to generate revenue for commercialization and to generate more data for accelerated learning, and civil and military certification. The program is designed to certify safety and airworthiness, procure systems for the most promising missions, and reach operational capability by FY23. Expanding our R&D enterprise from creator to catalyst is key for accelerating dual-use technology and countering the advantages of state-sponsored industrial bases. Based on the success of this model, AFWERX Prime announced Space Prime as the follow-on to “Agility Prime.” Other potential Primes go across five sectors to include commercial alternative energy, autonomy for mission and maneuver, digital engineering and advanced wargaming, supersonic travel, and microelectronics.



Foundational to the success of any of these AFWERX efforts is the amazing innovation network of Airmen and Guardians being empowered by Spark. AFWERX Spark has implemented fellowship programs to include the Defense Ventures Fellows, AFRL Fellows, and Academic fellows to rotate through AFWERX or private industry. Additionally, Spark empowers over 80 base-level Spark Cells to ensure close connectivity with current needs of our Airmen and Guardians.

### **Integrated and Adaptable Acquisitions**

Our potential adversaries are modernizing and advancing individual systems while bringing families of systems (or systems of systems) together into an architecture to deny U.S. interests and counter potential U.S. action. To meet this threat we must not just field capable individual systems but also integrate our systems so they can work in unison to achieve the necessary operational effects on increasingly rapid timelines allowing us to fight at machine speeds. The Department of the Air Force must not only invest in war-winning capabilities but also invest in war-winning technology architectures. By way of analogy, it is no longer sufficient to have the right ingredients, but we must also have the best recipe.

To achieve this integrated approach, we continue to design, demonstrate, and evaluate a Department of the Air Force-wide integrated architecture under the auspices of our Department of the Air Force Chief Architect. This effort will require programs and platforms themselves to be built with agility via open systems and open standards so that they can adapt and upgrade components quickly in response to threats or opportunities to integrate technology as advances are made. We will also be engaged in a regular campaign of learning at the architecture level with live demonstrations and evaluations of how we fight and where we fight. This is critical to moving from simply buying ingredients and hoping they form a coherent recipe, to a deliberate approach that impacts overall Air Force and Space Force architecture design, investments, technical requirements for future capabilities, and acquisition baseline updates for current systems.

An example of this impact of force level demonstration and evaluation occurred in February of this year during an Architecture Demonstration and Evaluation with U.S. European Command. This effort showed the importance of demonstrating and evaluating at the architecture level not only "how" the Department fights but also "where" it fights. By taking Architecture Demonstrations and Evaluations to the field, the Department uncovered mission-

critical gaps that could not have been uncovered merely at test ranges. This testing allows us to discover and fix the problems now rather than on the road to conflict when it would be too late to correct. We are committed to working with our Joint and Allied Partners so that existing systems can join easily. We ask Congress to support this capability so that future operators on the battlefield enjoy the same empowered capabilities they presently enjoy at home.

### **Connecting With the Joint Force**

One effort that will stress how fast and smart our requirements, acquisition, and operations process can move is Joint All-Domain Command and Control (JADC2) powered by the Advanced Battle Management System (ABMS). Charged by the Secretary of Defense with leading the concept development for JADC2, the Department of the Air Force is building ABMS to create decision superiority by delivering relevant information and capabilities to warfighters and operators at all echelons. ABMS will integrate today's and tomorrow's sensors; develop applications embedded with artificial intelligence, sophisticated algorithms, and multi-layered protections to make sense of massive amounts of trusted data; link space capabilities with weapons systems and personnel across all domains; and design pods, platforms, pathways, procedures, and policies that connect and integrate the warfighter better and faster than in any time in our history.

On 24 November 2020, the Department of the Air Force Rapid Capabilities Office (DAF RCO) was assigned as the Integrating Program Executive Office (PEO) for ABMS in a deliberate transition to start acquiring enduring capability through focused acquisition efforts and investments in digital infrastructure. Moving forward, the DAF RCO will build on the Chief Architect Office (CAO) work from 2019-2020 which focused ABMS resources on technology maturation across product lines identified as "ONES" and Onramp demonstration activities to prove the viability of the JADC2 operational construct. Upon transition to the DAF RCO, the product lines were replaced with a more streamlined acquisition framework and supporting personnel returned to originating Program Offices, laboratory directorates, and integrated product teams for continued maturation and proliferation.

The ABMS acquisition effort will pursue two interconnected investment paths: enduring digital infrastructure investments and Capability Release packages, which leverage those enduring investments but focus on closing kill-chains and delivering immediate operational capability to the warfighter. DAF RCO is working in conjunction with the acquisition

community to ensure Air Force and Space Force systems have seamless interoperability and compatibility to meet the JADC2 operational requirements. The six ABMS capabilities required to connect the warfighter are secure processing, connectivity, data management, applications, sensor integration, and effects integration.

Driven by requirements approved by the Chief of Staff of the United States Air Force and the Chief of Space Operations, Capability Release #1 (CR #1) (Airborne Edge Node) will focus on the edge network to enable sharing of information across 5th generation tactical air and provide situational awareness to KC-46 and C2 nodes. Data from CR #1 (Airborne Edge Node) will enable faster decision-making by the tactical, operational, and strategic customers.

Thank you again for the opportunity to testify before this subcommittee. The dialogue we have today will help us design, build, and operate a force capable of fighting and winning now and in the future.