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# AFOTEC

AIR FORCE OPERATIONAL TEST & EVALUATION CENTER



## YEAR IN REVIEW

# 2022

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# AFOTEC

## YEAR IN REVIEW

# 2022

by Dr. Stephanie M. Smith  
AFOTEC Chief Historian

The Air Force Operational Test and Evaluation Center (AFOTEC), first established in 1974, conducted operational test and evaluation (OT&E) of weapons and weapons systems to support the warfighter and inform key stakeholders in the acquisitions communities of the U.S. Air Force (USAF) and Department of Defense (DoD). Operational test subjected systems to realistic combat conditions, in contrast to developmental test, which determined whether a weapons system met specifications and requirements. The center had served as the sole Operational Test Agency (OTA) for the USAF since its establishment in 1974, while also serving as the U.S. Space Force (USSF) OTA. AFOTEC would continue in this role until the Space Training and Readiness Command (STARCOM) achieved initial operational capability (IOC) as the Space Force's own Operational Test Agency.<sup>1</sup> AFOTEC's nearly 700 personnel supported 90+ operational test programs valued at \$1.3 Trillion in Research, Development, Test and Evaluation (RDT&E) funds in Calendar Year (CY) 2022.<sup>2</sup> While a small organization, AFOTEC had an outsized impact in helping to field Air Force capabilities "faster and smarter."<sup>3</sup>



Test projects that fell under the aegis of the center included systems designated Acquisition Category (ACAT) I, ACAT II, Multi-Service Operational Test and Evaluation (MOT&E) programs with Air Force equities, and projects under oversight by the Director of Operational Test and Evaluation (DOT&E), Office of the Secretary of Defense (OSD), which included some ACAT III test programs. ACAT I programs entailed those designated Major Defense Acquisition Programs (MDAP) worth more than \$525 million in RDT&E funds and \$3.065 billion in total procurement costs. ACAT II included those programs valued at more than \$200 million in RDT&E funds and over \$920 million in procurement costs.<sup>4</sup> AFOTEC also partnered with the Air Force Research Laboratory's Strategic Development, Planning and Experimentation office (AFRL/SDPE) to provide operational test

expertise to experimentation and prototyping programs to advance technological development.<sup>5</sup>

AFOTEC's mission called for informing the warfighter and acquisition through operational test. Under Commander Maj Gen James R. Sears, Jr., the center's personnel had begun to envision themselves as the leaders of the test enterprise, accelerating change. This objective aligned with Chief of Staff of the Air Force (CSAF) General C.Q. Brown, Jr.'s action orders to "accelerate change, or lose," a push to maintain both the USAF's competitive edge as well as ensure AFOTEC's relevance in 2030.<sup>6</sup>



Outgoing AFOTEC commander, Maj Gen James R. Sears, Jr. (pictured left) and Incoming AFOTEC Commander, Brig Gen Michael T. Rawls (pictured right) during the Change of Command Ceremony on July 19, 2022, at Kirtland AFB, New Mexico. (USAF Photo courtesy 377 ABW)

Significant turnover took place among the leadership of Headquarters AFOTEC in CY2022, with personnel changes among four of the center's top five senior leaders. On January 27, 2022, Chief Master Sergeant (CMSgt) Christopher D. Griste became the first AFOTEC Command Chief in the history of the center. The position of Command Chief replaced that of Chief Enlisted Manager, allowing CMSgt Griste to support the 180 enlisted personnel at AFOTEC while giving him the standing with senior enlisted leaders (SEL) across the USAF to best represent the center.<sup>7</sup> Colonel Alicia D. Abrams became the center's Vice Commander in July 2022, following the June 24 retirement of Col Matthew T. Magness after seven years of service to AFOTEC. Dr. Thomas Spencer became the permanent AFOTEC Executive Director July 18. On July 19, Brig Gen Michael T. Rawls, former Commandant of Air War College, assumed command of AFOTEC from Maj Gen Sears.<sup>8</sup>

Leadership of three of the four AFOTEC detachments also changed in CY2022. Colonel Timothy Stevens, Commander, Detachment 2, retired from the U.S. Air Force in June 2022, and detachment Deputy

Commander Lt Col Joel Doss initially succeeded him. AFOTEC Director of Operations (AFOTEC/A-3) Col Kevin M. Madrigal then assumed command of Detachment 2 on September 13, 2022.<sup>9</sup> Lieutenant Colonel Christine C. Hernandez assumed command of Detachment 3 from Col (sel) Jeremy R. Russell on June 8, 2022.<sup>10</sup> Colonel Glenn A. Rineheart, who had served as Detachment 5 Commander since July 2017, relinquished command to Col Nicholas J. Butler on July 28, 2022.<sup>11</sup> Colonel Daniel Javorsek continued as Commander, AFOTEC Detachment 6 at Nellis AFB, Nev., in CY2022.

The organization of the center also underwent changes in CY2022. AFOTEC relied upon its detachments and their operating locations (OL) for execution of operational test and evaluation. These existed only so long as required to conduct operational test and evaluation at a specific location. Detachment 2 had only one operating location assigned in CY2022, Operating Location-Munich, Germany (OL-GE). Activated for a military member on exchange to the Universitaet Bundeswehr, Munich via the Air Force's Engineer and Scientist Exchange Program (ESEP), the operating location inactivated midyear upon completion of the military member's studies. In June 2022, the center inactivated two operating locations under AFOTEC/A3, Operating Location-McConnell AFB, Kansas (OL-MK), and Operating Location-Las Vegas, Nevada (OL-LN), both of which had conducted adversarial assessments as elements of cyber test.<sup>12</sup> In support of Detachment 3's operational test of the LGM-35A Sentinel, AFOTEC HQ approved the activation of Operating Location-Vandenberg Space Force Base, California (OL-VC) in July 2022.<sup>13</sup>

Amid these leadership and organizational changes, the center continued its commitment towards accelerating change under Commander Brig Gen Trey Rawls. Brigadier General Rawls emphasized CSAF General Brown's direction to "proceed until apprehended," an analogy for breaking down bureaucratic barriers.<sup>14</sup> When Brigadier General Rawls laid out his top three priorities for the center in December 2022, he also called upon AFOTEC to support the development and maturation of a synthetic simulation environment to enhance fifth generation and multi-ship test and training, and directed AFOTEC personnel to prioritize the management and sharing of data, while refining the center's processes for conducting cyber operational test.<sup>15</sup>

AFOTEC personnel also continued to apply to operational test its six core test principles (6Ps), codified in 2019, and endorsed by all the military service Operational Test Agencies and DOT&E. The application of the six core test principles helped shorten test timelines and speed capability to the warfighter. The first of the 6Ps ensured the involvement of operational testers as early as possible in the acquisition process. The second principle encouraged testers to tailor the scope of a test effort to the situation. The third test principle provided customers early and continuous feedback long before commencing the official Initial Operational Test and Evaluation (IOT&E) phase. Streamlining test processes and products constituted the fourth test principle. The fifth principle led testers to continue integrating and combining developmental and operational test, while the sixth core test principle encouraged them to remain adaptive.<sup>16</sup>

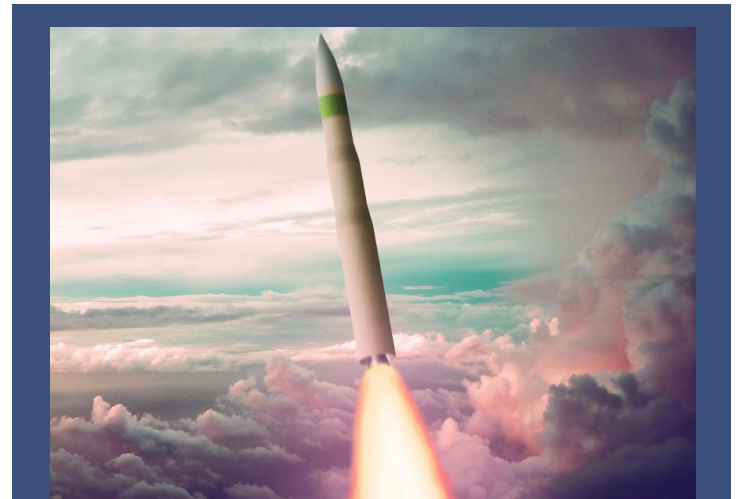
The U.S., along with its peers and adversaries, had begun testing hypersonic weapons amid an escalating and dynamic security environment.<sup>17</sup> In 2022, this included a new hypersonic system under test by Detachment 2, co-located with the 96th Test Wing at Eglin Air Force Base (AFB), Fla. Detachment 2 conducted operational test and evaluation of aerial weapons, and other systems, including agile combat support, electronic warfare, mission planning, command, control, and communications (C3), chemical and biological, medical and other data systems.<sup>18</sup> In June, the AFOTEC Commander delegated to Detachment 2 the operational test of a new air-to-ground anti-

access/area denial (A2/AD) weapon, the Stand-in Attack Weapon (SiAW). Designed for internal carriage in the F-35A, the SiAW would target anti-ship/anti-satellite systems, Global Positioning System (GPS) jammers, and integrated air defense systems.<sup>19</sup>



A B-52H Stratofortress assigned to the 419th Flight Test Squadron is prepared to conduct flight test of the hypersonic AGM-183A Air-launched Rapid Response Weapon at Edwards Air Force Base, California, Aug 8, 2020. (Giancarlo Casem/Air Force)

Testers with Detachment 2 also continued to support the Department of Defense priority for developing hypersonics by cooperating in combined developmental and operational test and evaluation of the existing Air-Launched Rapid Response Weapon (ARRW) program in CY2022.<sup>20</sup> Following several flight test failures in 2021, the Air Force conducted two successful boost glide tests of the AGM-183A long-range hypersonic ARRW on May 14 and July 12, 2022. In both cases, a 419th Flight Test Squadron (419 FLTS) developmental test B-52H mothership from Edwards AFB released the ARRW over the U.S. Navy's Point Mugu Sea Test Range off the coast of Southern California. During the third release and twelfth flight test accomplished July 12, the ARRW reached hypersonic speed (i.e., Mach 5 or above) and met all planned benchmarks, completing the ARRW booster test phase. The release of a prototype ARRW from the 419 FLTS B-52H on December 9, 2022, at the Sea Test Range initiated the flight test phase of the program.<sup>21</sup>



Artist rendition of LGM-35A Sentinel, formerly the Ground Based Strategic Deterrent (GBSD).

Working to help equip the nation with effective strategic nuclear capabilities, AFOTEC's Detachment 3, Hill AFB, Utah, conducted operational test and evaluation of new and updated nuclear-related systems. The LGM-35A Sentinel, formerly the Ground Based Strategic Deterrent (GBSD), would replace the LGM-30 Minuteman

III Intercontinental Ballistic Missile, the aging ground-based pillar of the American nuclear triad. Detachment 3 personnel formed part of the GBSD/Sentinel Combined Test Force (CTF) along with developmental testers and other stakeholders. Detachment 3 also planned operational test of two Mk21 programs, the Mk21A replacement Sentinel reentry vehicle and the Fuze Modernization program to replace the Mk21 arming and fuzing assembly. Personnel at Detachment 3's Operating Location-Offutt AFB, Neb. (OL-ON), worked to add operational realism into operational test or sustainment of nuclear command, control, and communications (NC3) in the Nuclear Planning and Execution System (NPES) program. Co-located with the U.S. Strategic Command (USSTRATCOM), Detachment 3 directly supported its mission to deter strategic attack.<sup>22</sup>



A T-7A Red Hawk during a training flight. (U.S. Air Force photo)

Helping to ensure the safety, effectiveness, and suitability of new or upgraded aircraft, Detachment 5 at Edwards AFB, Calif., conducted operational test and evaluation of bomber, tanker, flight training, airlift, special operations, unmanned aerial systems, as well as intelligence, surveillance, and reconnaissance (ISR) and C3 systems.<sup>23</sup> In CY2022, some of Detachment 5's significant OT&E projects included the HH-60W Jolly Green II helicopter, KC-46A Pegasus tanker, MH-139A Grey Wolf helicopter, T-7A Redhawk trainer, and the VC-25B Presidential Aircraft Recapitalization aircraft. Four of Detachment 5's five operating locations in CY2022 executed operational test of some of the newest airframes assigned to Detachment 5. Operating Location-Hurlburt Field, Florida (OL-HF) conducted OT&E of special operations systems, such as for the HH-60W Jolly Green II. Operating Location-San Antonio, Texas (OL-ST) executed OT&E of the VC-25B Presidential Aircraft Recapitalization project intended to replace Air Force One. Operating Location-St. Louis, Missouri (OL-SM) effected OT&E of the T-7A Redhawk Advanced Pilot Trainer. Operating Location-Everett, Wash., (OL-EW) Boeing Field conducted operational test of the KC-



An HH-60W Jolly Green II helicopter is parked on the flightline during the HH-60W Initial Operational Capability ceremony at Moody Air Force Base, Ga., Sept. 9, 2022. The ceremony displayed the platform's operational capabilities and signifies the HH-60W has met the criteria for IOC and awaits declaration. (U.S. Air Force photo by Senior Airman Rebeckah Medeiros)

46A Pegasus. As the only exception, Operating Location-Tokyo, Japan (OL-TJ) supported a single scientist under the Engineer and Scientist Exchange Program (ESEP).<sup>24</sup>

Detachment 5 testers had also developed a novel approach to employing the AFOTEC six core test principles. While practicing early involvement and providing continuous and cumulative feedback to program stakeholders, Detachment 5 testers pioneered a system of reporting and tracking their recommendations to closure. This helped accelerate early discovery of deficiencies, moderate program delays, and could shorten the IOT&E phase. Detachment 5's Combat Rescue Helicopter (CRH) test team had conducted numerous pre-IOT&E activities on the HH-60W in previous years. This permitted Detachment 5 personnel to complete 41 percent of the required HH-60W IOT&E test points before the IOT&E phase commenced. The official HH-60W IOT&E phase lasted only six months, between April 1 and October 4, 2022, and concluded with a decision in October by Gen Mark Kelly, Commander, Air Combat Command (ACC) to declare HH-60W had reached IOC. An IOC declaration meant that the Air Force had attained the ability to effectively employ the HH-60W weapons system.<sup>25</sup>



A KC-46A Refueling an F-15. (U.S. Air Force photo by Master Sgt Michael Jackson)

Testers from AFOTEC Detachment 5 also cooperated with developmental testers to execute operational test of the KC-46A Pegasus tanker, reaching numerous milestones and significantly expanding its approved capabilities in CY2022. A series of Interim Capability Releases approved by Commander, Gen Mike Minihan, Air Mobility Command (AMC), greatly expanded the list of approved KC-46A aerial refueling receivers. By January 2022, Detachment 5 had completed 60 percent of effectiveness tests measuring how well the KC-46A worked in the field, and 93 percent of suitability tests, quantifying the aircraft's level of availability, interoperability, and reliability in the field.<sup>26</sup> Integrated developmental and operational tests later led the Air Force to approve the KC-46A to refuel 70 percent of receiver aircraft requiring aerial refueling (A/R) support from the Air Force's U.S. Transportation Command (USTRANSCOM). AMC approved the tanker to refuel the F-22 and F-35 in February, and by April 2022, KC-46A testers had conducted the first operational refueling of a foreign partner nation's receiver aircraft, the Spanish EF-18. The KC-46's first landing in Africa in Rabat, Morocco followed on 1 May.<sup>27</sup> By June 2022, AMC had approved the KC-46A to refuel 97 percent of aerial refueling receivers, which included the B-1B, B-2, B-52H, C-5, C-17, C-130 variants, E-3G, E-4B, F-15, F-16, F/A-18, F-22, F-35, KC-10, KC-46, and the U.S. Navy's P-8.<sup>28</sup> On August 29, 2022, testers deployed with three KC-46A tankers for a training exercise at Al Udeid Air Base in Qatar under U.S. Central Command (USCENTCOM) to refuel F-15E Strike Eagle aircraft.<sup>29</sup> As of 14 September 2022, AMC Commander Gen Minihan cleared the tanker for aerial refueling of aircraft on worldwide deployments as tasked by Department of Defense combatant commanders.<sup>30</sup>

While CY2022 saw testers make many important strides towards verifying operational capability of the KC-46A, test personnel had already identified some critical deficiencies that still remained unresolved by the end of the year. One significant issue had arisen with the aircraft's Flight Management System, which experienced instability during a trans-Pacific flight and required a software update. Testers had also identified a critical deficiency with cracking of the air refueling drain tube in freezing temperatures, which required a redesign. Detachment 5 reported an issue in April 2022 with faulty trim on an overwing door that could hinder the ability of passengers to escape during an emergency.<sup>31</sup> Some of the KC-46A's most longstanding and significant issues related to the Remote Vision System (RVS), with no immediate solution. The RVS cameras served as a replacement for a human boomer in the rear of the tanker, allowing boomers to oversee aerial refueling on a series of monitors. One deficiency with the RVS appeared under specific sun angles, or with reflections off water or clouds that washed out the images and depth perception provided by the RVS.<sup>32</sup> Detachment 5 KC-46A testers participated in a Critical Design Review for RVS 2.0 in June 2022. However, by October 2022, the Air Force had announced delays to fielding an updated RVS until 2025 due to airworthiness, design, and supply chain issues<sup>33</sup>

Critical deficiencies with high axial loads on the refueling boom on the KC-46A boom also still awaited closure in CY2022. This meant the KC-46A had yet to receive clearance to refuel the lightweight A-10 Warthog. Refueling a lightweight aircraft like the A-10 from the KC-46A required the receiver pilot to apply additional thrust to remain in contact with the KC-46A boom. This issue increased the chances of the A-10 lunging toward and possibly striking the KC-46A boom. Flight testers had initially identified the boom loads issue in 2018. Redesign of the refueling boom's telescoping actuator had an expected completion date of 2024.<sup>34</sup> The KC-46A IOT&E phase would continue until completion of operational test of the new Remote Vision System and resolution of refueling system boom issues.



A 40th Flight Test Squadron F-15EX Eagle II prepares to depart for an integrated developmental and operational test Weapons System Evaluation Program mission January 25, 2022, at Tyndall Air Force Base, Fla. The aircrew fired an AIM-120 missile during the sortie marking the first live fire from the Air Force's newest fighter aircraft. The fighter fired the missile at a BQM-167 aerial target over the Gulf of Mexico. (U.S. Air Force photo by 1st Lt. Lindsey Heflin)

Helping to equip the U.S. with fourth and fifth generation aircraft to meet a pacing multi-domain threat, testers at Detachment 6 conducted operational test and evaluation of advanced fighter aircraft and upgrades to fourth and fifth generation airframes. In CY2022, the Detachment 6 portfolio included operational test of the upgrades to the F-22, F-35 Continuous Capability Development and Delivery (C2D2), the equivalent of a Block 4 software upgrade to the Joint Strike Fighter, and the F-15EX Eagle II. The F-15EX would replace the

Air Force's aging F-15C/D fleet with a fly-by-wire aircraft based on the F-15QA designed for the Qatar Emiri Air Force. From the first missile shot of an AIM-120D fired at a BQM-167 target in mid-January 2022, to the first live fire missile shots in August 2022, Detachment 6's test team participated in integrated developmental and operational tests that would help verify the F-15EX's combat capability as a long-range standoff system.<sup>35</sup> Detachment 6 also conducted OT&E of a subordinate F-15EX system, the Eagle Passive and Active Warning and Survivability System (EPAWSS).<sup>36</sup> Integrated developmental and operational test and evaluation of the F-15 EPAWSS took place in the last half of CY2022, and allowed testers to achieve significant milestones. The Air Force approved F-15 EPAWSS Milestone B, or Low-Rate Initial Production, and installation of the EPAWSS system on operational F-15E aircraft began July 19, 2022. During joint BLACK FLAG exercises in September 2022, a combined test team developed tactics for both EPAWSS and the F-15EX, including expanded formation flying. The exercise also allowed testers to practice jamming of simulated enemy aircraft sensors, validating the EPAWSS working in conjunction with the F-35A, the Air Force variant of the Joint Strike Fighter.<sup>37</sup>



A F-35B lands aboard amphibious assault ship USS Tripoli, March 31, 2022, as part of a joint U.S. Operational Test Team and U.S. Marine Corps' Lightning carrier concept demonstration. (U.S. Navy photo by Mass Communication Specialist 3rd Class Maci Sternod)

Detachment 6's operating location, Operating Location-Edwards AFB, Calif., (OL-EC), supported the U.S. Operational Test Team (UOTT) under Detachment 6. Members of the UOTT continued OT&E of the F-35, first under the command of Lt Col David Merritt, U.S. Marine Corps, and later CDR Charles E. Escher, U.S. Navy. The UOTT executed four large-scale, operationally relevant F-35 test events within four weeks in May 2022, successfully validating new capabilities. The first test event, an F-35B Close Air Support mission at Marine Corps Air Station Yuma, Ariz., validated the F-35's integration with ground forces, as well as the Interim Full Motion Video system, an interim F-35B capability. A long-range multi-ship, multi-variant mission at the Pacific Sea Test Range at Naval Air Station Point Mugu verified the F-35's ability to defend against a simulated advanced adversary and operate at long range. The UOTT also completed the first two F-35 live-fire missile events in its history, validating the integration of the AIM-9X with the most recent version of Joint Strike Fighter software. The UOTT also participated in a joint test with the U.S. Navy to verify F-35 offensive counter air and suppression of enemy air defenses capabilities in a simulated contested environment at the Nevada Test and Training Range. Finally, late in CY2022, UOTT personnel cooperated with developmental testers from the 461st Flight Test Squadron at Edwards AFB, members of Marine Fighter Attack Squadrons VMFA-121 and VMFA-242, and the 356th Fighter Squadron assigned to the Pacific Air Forces in several test events.



An F-35A Lightning II flies with an F-22 Raptor to test interoperability between the two aircraft platforms. A team of engineers, analysts, and pilots from the United States Operational Test Team, or UOTT, and Air Force Operational Test and Evaluation Center Detachment 6 are pushing the boundaries of F-35 combat aircraft operational testing. (U.S. Air Force photo)

Operating from two locations, Marine Corps Air Station, at Iwakuni, Japan, and aboard the U.S.S Tripoli, the joint team collected F-35 flight test data in operationally realistic environments, helping to shape agile software development of F-35 software upgrades, and shared new F-35 capabilities with pilots in the Pacific Theater.<sup>38</sup>

Operational test of rapid capabilities development and experimentation also took place within AFOTEC. The center's Experimentation Directorate (AFOTEC/EX) supported operational test of around a dozen rapid prototyping or experimentation projects in CY2022. This included several projects under the Air Force Research Laboratory's Strategic Development Planning and Experimentation Directorate, including several Air Force Vanguard programs. One of these, both an AFRL/SDPE and an Air Force Vanguard program, the Golden Horde project encompassed an effort called Colosseum for the design of a government-owned architecture to permit test of digital engineering algorithms and concepts by third-party vendors. Golden Horde would also support swarming and autonomous weapons systems already in the inventory as well as those still under development.<sup>39</sup>

AFOTEC had also assigned another Air Force Vanguard project to the Experimentation Directorate, the Autonomous Attributable Aircraft Experiment (AAAx), also known as Skyborg. This program sought to develop and integrate an Autonomous Core System with surrogate Skyborg platforms, including the MQ-20, XQ-58, or Airpower Teaming System. Flight experimentation would take place during ORANGE FLAG exercises focused on all-domain, large force test of advanced technologies and interoperability. Secretary of the Air Force the Honorable Frank Kendall III even envisioned a fleet of autonomous drones partnered with fifth-generation, or even a future sixth-generation aircraft, as part of the Air Force inventory.<sup>40</sup> Testers achieved several Skyborg milestones in 2022. In July, two XQ-58 Valkyrie drones completed unspecified but successful tests in support of the Skyborg program.<sup>41</sup> In November 2022, the Air Force Research Laboratory led and AFOTEC cooperated in a final demonstration of the autonomous

collaborative core Skyborg software.<sup>42</sup>

Cyber capabilities constituted another significant capability enabled by AFOTEC testers and highlighted by the Air Force's highest leadership. In May 2022, Secretary of the Air Force Kendall emphasized the way that cyber capabilities "critically underpin" the Air Force's core mission.<sup>43</sup> AFOTEC testers continued to make cyber test a routine part of OT&E. Operational test and evaluation including two phases of cyber test, the Cooperative Vulnerability and Penetration Assessment (CVPA) and an Adversarial Assessment (AA). During the CVPA, a blue or friendly team attempted to exploit existing vulnerabilities in the operational environment. In the second cyber test phase, a certified adversarial cyber team conducted the AA to evaluate the Air Force's ability to protect the system under test from cyberattack and restore mission capability. Finally, AFOTEC test personnel supported assessments of cybersecurity during combatant command exercises, including the North American Aerospace Defense Command/Northern Command's (NORAD/NORTHCOM) annual VIGILANT SHIELD and United States Pacific Command's PACIFIC SENTRY.<sup>44</sup>



AFOTEC also continued its 2021 tri-center partnership with the Air Force Test Center (AFTC) and U.S. Air Force Warfare Center (USAFWC), intended to streamline and integrate developmental and operational T&E.<sup>45</sup> The AFOTEC Tri-Center Working Group met every two weeks to pursue practical integration among the centers and plan for the annual commanders' Tri-Center Integrated Test Council. The Working Group focused on the maintenance of the joint centers' cooperation through coordinated attempts to extend the centers' cooperation with projects such as planning and integrating live and virtual test and training between the three centers, digital engineering efforts, potential cost sharing opportunities, and cooperation/collaboration on big data management.<sup>46</sup>

The Commanders of AFOTEC, Air Force Test Center, and the U.S. Air Force Warfare Center also chaired their second annual Tri-Center Integrated Test Council on July 18, 2022. They agreed on efforts to help influence and modernize the acquisition system and align their strategic visions while planning for future collaboration. Goals for this test council meeting included addressing test integration, future investments, test capability cost sharing among the centers, and ensuring cyber resilience of weapons systems. Therefore, the three Commanders approved a study of the feasibility of working with the 16th Air Force, the service's information warfare specialists, to help ensure cyber security of weapons systems. They also agreed to study potential cooperative efforts in experimentation and rapid prototyping, fostering earlier test involvement while helping bridge the shift from experimentation to programs of record.<sup>47</sup>

Finally, AFOTEC's execution of operational test of both new and upgraded aircraft, weapons, and systems made the center the Air Force's independent voice in acquisition. The center's personnel refined their approach to operational test and adopted new organizational structures in CY2022, allowing AFOTEC to better serve the warfighter, the military acquisition system, and the nation. Their commitment to answering the Chief of Staff's call to "proceed until apprehended" and dedication to accelerate change in test and evaluation remained unwavering as AFOTEC's people worked to "field tomorrow's Air Force faster and smarter."<sup>48</sup>



XQ-58A Valkyrie demonstrator first flight as part of the Skyborg program. (U.S. Air Force photo)

## GLOSSARY

|           |                                                                                              |            |                                                             |
|-----------|----------------------------------------------------------------------------------------------|------------|-------------------------------------------------------------|
| 6Ps       | six core test principles                                                                     | OL-EC      | Operating Location-Edwards AFB, California                  |
| A2/AD     | Anti-Access/Area Denial                                                                      | OL-EW      | Operating Location-Everett, Washington                      |
| AA        | Adversarial Assessment                                                                       | OL-GE      | Operating Location-Munich, Germany                          |
| AAAx      | Autonomous Attributable Aircraft Experiment                                                  | OL-HF      | Operating Location-Hurlburt Field, Florida                  |
| ACAT      | Acquisition Category                                                                         | OL-ON      | Operating Location Offutt AFB, Nebraska                     |
| ACC       | Air Combat Command                                                                           | OL-SM      | Operating Location-St Louis, Missouri                       |
| AFB       | Air Force Base                                                                               | OL-ST      | Operating Location-San Antonio, Texas                       |
| AFOTEC    | Air Force Operational Test and Evaluation Center                                             | OL-VC      | Operating Location-Vandenberg, Space Force Base, California |
| AFOTEC/EX | AFOTEC Experimentation Directorate                                                           | OT&E       | Operational Test and Evaluation                             |
| AFRL/SDPE | Air Force Research Laboratory Strategic Development Planning and Experimentation Directorate | OTA        | Operational Test Agency                                     |
| AFTC      | Air Force Test Center                                                                        | RDT&E      | Research, Development, Test and Evaluation                  |
| AMC       | Air Mobility Command                                                                         | RVS        | Remote Vision System                                        |
| A/R       | Aerial Refueling                                                                             | SEL        | Senior Enlisted Leaders                                     |
| ARRW      | Air-Launched Rapid Response Weapon                                                           | SiAW       | Stand-in Attack Weapon                                      |
| Brig Gen  | Brigadier General                                                                            | STARCOM    | Space Training and Readiness Command                        |
| C2D2      | Continuous Capability Development and Delivery (F-35)                                        | TCITC      | Tri-Center Integrated Test Council                          |
| C3        | command, control, and communications                                                         | UOTT       | U.S. Operational Test Team                                  |
| CDR       | Commander (U.S. Navy)                                                                        | USAF       | U.S. Air Force                                              |
| CMSgt     | Chief Master Sergeant                                                                        | USAFWC     | U.S. Air Force Warfare Center                               |
| Col       | Colonel                                                                                      | USCENTCOM  | U.S. Central Command                                        |
| CRH       | Combat Rescue Helicopter                                                                     | USSF       | U.S. Space Force                                            |
| CSAF      | Chief of Staff of the Air Force                                                              | USSTRATCOM | U.S. Strategic Command                                      |
| CTF       | Combined Test Force                                                                          | USTRANSCOM | U.S. Transportation Command                                 |
| CVPA      | Cooperative Vulnerability and Penetration Assessment                                         |            |                                                             |
| CY        | Calendar Year                                                                                |            |                                                             |
| DoD       | Department of Defense                                                                        |            |                                                             |
| DOT&E     | Director, Operational Test and Evaluation                                                    |            |                                                             |
| EPAWSS    | Eagle Passive and Active Warning and Survivability System                                    |            |                                                             |
| ESEP      | Engineer and Scientist Exchange Program                                                      |            |                                                             |
| FLTS      | Flight Test Squadron                                                                         |            |                                                             |
| GBSD      | Ground Based Strategic Deterrent                                                             |            |                                                             |
| Gen       | General                                                                                      |            |                                                             |
| GPS       | Global Positioning System                                                                    |            |                                                             |
| IOC       | initial operational capability                                                               |            |                                                             |
| IOT&E     | Initial Operational Test and Evaluation                                                      |            |                                                             |
| ISR       | intelligence, surveillance, and reconnaissance                                               |            |                                                             |
| Lt Col    | Lieutenant Colonel                                                                           |            |                                                             |
| Maj Gen   | Major General                                                                                |            |                                                             |
| MOU       | Memorandum of Understanding                                                                  |            |                                                             |
| NC3       | Nuclear Command, Control, and Communications                                                 |            |                                                             |
| NORAD     | North American Aerospace Defense Command                                                     |            |                                                             |
| NORTHCOM  | Northern Command                                                                             |            |                                                             |
| NPES      | Nuclear Planning and Execution System                                                        |            |                                                             |

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