



December 2021

MILITARY AIR SUPPORT

DOD Has Increased Its Use of Contracts to Meet Training Requirements

Accessible Version



A Century of Non-Partisan Fact-Based Work

GAO Highlight

Highlights of [GAO-22-104475](#), a report to the Committee on Armed Services, House of Representatives

Why GAO Did This Study

DOD components awarded almost \$8 billion for air support contracts in fiscal years 2015 through 2020. These contracts provide non-military aircraft and personnel to replicate the role of combat aircraft for various training activities. The components used the contracts to meet training needs, address shortages in available military aircraft, and manage costs.

House Report 116-442, accompanying a bill for the National Defense Authorization Act for Fiscal Year 2021, included a provision for GAO to review the use of air support contracts during military training. This report describes (1) how DOD has used air support contracts for training to replicate adversary air forces and to provide aircraft for close air support since fiscal year 2015, and (2) what steps DOD has taken to gain efficiencies and determine the effectiveness of air support contracts.

GAO reviewed documentation on air support contracts for fiscal years 2015 through 2021, including performance work statements, task orders, and invoices; analyzed the increase or decrease in the use of air support contracts, including the number of contracts and operating locations; and interviewed officials to determine factors contributing to any increases or decreases in the use of the contracts. GAO also reviewed documentation on specific initiatives DOD components have taken since 2015 to gain greater efficiencies and to determine the effectiveness of air support contracts in achieving training requirements.

View [GAO-22-104475](#). For more information, contact Cary Russell at (202) 512-5431 or russellc@gao.gov.

December 2021

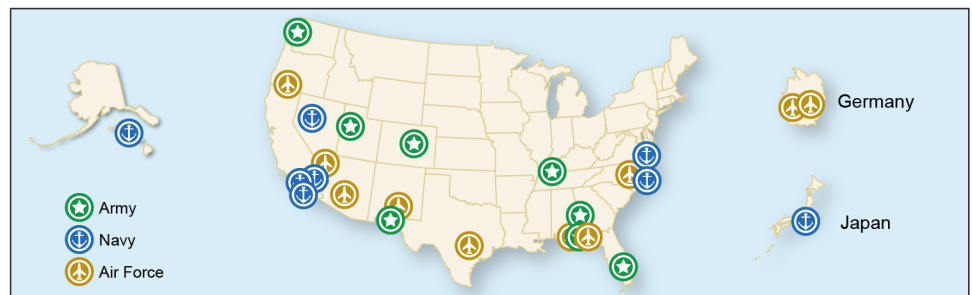
MILITARY AIR SUPPORT

DOD Has Increased Its Use of Contracts to Meet Training Requirements

What GAO Found

Department of Defense (DOD) components use air support contracts for certain training activities. Such contracts have supported DOD training at locations in the United States, Europe, and Japan (see figure).

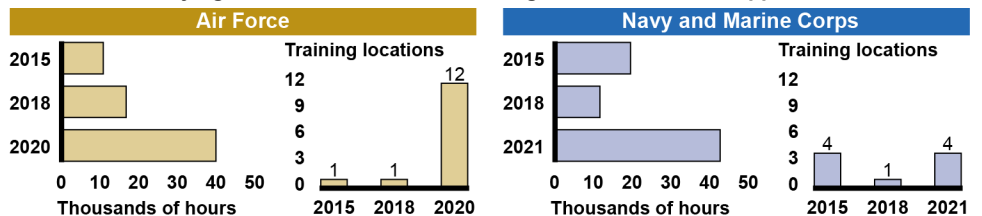
DOD Training Locations with Air Support Contracts



Source: GAO analysis of Department of Defense (DOD) data and interviews with DOD officials; Map Resources (map). | GAO-22-104475

Since fiscal year 2015, DOD components have increased the availability of air support contract flying hours and expanded the number of training locations to address some training needs (see figure). The Air Force, Navy, and Marine Corps have used air support contracts to replicate adversary air forces to train new fighter pilots and to support training exercises. DOD components have also used the contracts to train air controllers on close air support procedures.

DOD Available Flying Hours and Number of Training Locations for Air Support Contracts



Source: GAO analysis of Department of Defense (DOD) documentation and interviews with DOD officials. | GAO-22-104475

Accessible Data Table for Figure Highlight (Part 1 of 2)

Air Force	Flying hours	Training location
"2015	83	1
"2018	280	1
"2019	6400	12

Accessible Data Table for Figure Highlight (Part 2 of 2)

Navy and Marine Corps	Flying hours	Training locations
"2015	295	4
"2018	107	1
"2021	442	4

Note: Figures include data for available flying hours and training locations for the contract award year, and do not reflect the cumulative total of the available flying hours or locations across all contracts in a fiscal year, which would be greater.

DOD components have taken steps to gain greater efficiencies in the use of air support contracts. These steps included consolidating contract administration to reduce redundant costs, among others. DOD components have also established processes to monitor the performance of air support contracts to meet established contracted requirements. The Air Force, Navy, and Marine Corps have taken steps to determine the effectiveness of these contracts, including evaluating the role of air support contracts among other future options for their adversary air training programs. In particular, the services are determining the appropriate mix of training capabilities, to include contract aircraft, as well as affordability and timeframes to modernize U.S. military adversary air capabilities. These reviews, to be completed in fiscal year 2022, are expected to affect future investments in air support contracts, according to DOD officials.

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Abbreviations

AFB	Air Force Base
CAF/CAS	Combat Air Force/Contracted Air Support
CLIN	Contractor Line Item Numbers
CPFH	Cost per flying hour
DOD	Department of Defense
FY	Fiscal Year
O&M	Operation and Maintenance
O&S	Operating and Support
SOCOM	U.S. Special Operations Command
TOPGUN	U.S. Navy Fighter Weapons School

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December 21, 2021

The Honorable Adam Smith
Chairman
The Honorable Mike Rogers
Ranking Member
Committee on Armed Services
House of Representatives

Department of Defense (DOD) components, including the Air Force, Navy, and Marine Corps, as well as U.S. Special Operations Command (SOCOM), awarded almost \$8.4 billion for air support service contracts in fiscal years 2015 through 2021. Air support services refers to the use of non-military contractor aircraft and personnel to replicate the role of combat aircraft for various training activities—most commonly to provide simulated adversary air forces for fighter-aircraft training and to prepare air controllers to conduct close air support.¹ The components used the contracts to meet training needs and to address shortages in, and manage costs for, available military aircraft.

The U.S. military has faced difficult choices in balancing current operational demands with the growing need to be prepared for future threats presented by near-peer adversaries. In 2018, the National Defense Strategy acknowledged an increasingly complex global security environment, defined by rapid technological change, challenges from adversaries in every operating domain, and the impact on military readiness from the longest continuous stretch of armed conflict in U.S. history. DOD's principal priority is preparing for long-term strategic competition with near-peer adversaries, such as China and Russia. The National Defense Strategy states that these priorities require increased and sustained investment because of the magnitude of the threats they pose to U.S. security and prosperity today, and the potential for those

¹Adversary air or "red air" missions are those in which the aircrews play the role of an adversary threat against aircrews flying a "blue" (U.S. and allied force) training sortie, or event. Close air support is an air action by aircraft against hostile targets that are in close proximity to friendly forces on the ground and that requires detailed integration of each air mission with the fire and movement of those forces. For purposes of our report, we refer to these services as air support contracts. Joint Chiefs of Staff, Joint Pub. 3-09.3, *Close Air Support* (June 10, 2019).

threats to increase in the future.² Moreover, the National Defense Authorization Act for Fiscal Year 2020 stated that it is the sense of Congress that it is critical that the Air Force has the capability to train against an advanced air adversary in order to be prepared for conflicts against a modern enemy.³

House Report 116-442, accompanying a bill for the National Defense Authorization Act for Fiscal Year 2021, included a provision for us to review the use of air support contracts during military training.⁴ This report describes: (1) how DOD has used air support contracts for training to replicate adversary air forces (“adversary air”) and to provide aircraft for close air support since fiscal year 2015, and (2) what steps DOD has taken to gain efficiencies and determine the effectiveness of air support contracts for training.

For our first objective, we analyzed documentation for current and past contracts for adversary air and close air support for training for fiscal years 2015 through 2021, including performance work statements, and task orders. We identified these air support contracts by interviewing DOD component officials and corroborated this documentation by searching the Federal Procurement Data System-Next Generation database.⁵ We analyzed the increase or decrease in the use of air support contracts, including the number of contracts, to include contract type, contractor details, operating locations, obligations, and the number of flying hours performed by the contractors by year to determine how DOD’s use of contracts has changed since fiscal year 2015.⁶ We also discussed with DOD officials factors contributing to the increase or decrease in the use of these contracts.

²DOD, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military’s Competitive Edge* (Jan. 19, 2018).

³Pub. L. No. 116-92, § 149 (2019).

⁴H.R. Rep. No. 116-442, at 93-94 (2020).

⁵The Federal Procurement Data System-Next Generation is the government-wide database used to report data on government procurements.

⁶Air support contract documentation establishes DOD component requirements for flying hours. For purposes of this report, flying hours refers to the training hours necessary to train a pilot, while a sortie comprises a full live training event and is not equal to flying hours.

To present information about costs for military aircraft and contractor aircraft that provide air support, we determined the methods DOD uses to calculate costs for military aircraft that are used for training. We did so by reviewing documentation and guidance on cost estimating and a Federally Funded Research and Development Center study on these methods, as well as through interviews with Air Force, Navy, and Marine Corps officials and with officials from the Under Secretary of Defense (Comptroller).⁷ To calculate cost per flying hour for military aircraft that are borne by the government, we calculated selected military aircraft's fleet costs divided by its flying hours. To select specific military aircraft examples to present data on cost per flying hour under the various methods DOD uses to calculate costs, we identified aircraft that have a primary mission involving both air-to-air and close air support for the Air Force, Navy, and Marine Corps.⁸ We confirmed our selections through interviews with military service officials.

To determine costs per flying hour for air support contracts that are used to replicate adversary air forces and provide aircraft for close air support training, we reviewed Air Force and Navy reports on these costs. We selected contract aircraft platforms to present information on cost per flying hour because these were the platforms used by contractors in providing air support under contracts for fiscal year 2020. We present data on cost per flying hour for both military aircraft and contract aircraft for fiscal year 2020 as it was the most recent fiscal year for which data was available at the time of our analysis.

For our second objective, we reviewed contracts and supporting documents from the Departments of the Air Force and Navy, and SOCOM for adversary air and close air support training missions for fiscal years 2015 through 2021. To determine the steps DOD components took to gain greater efficiencies in the use of contracts, we reviewed documentation and interviewed officials from the Air Force, Navy, and Marine Corps to discuss specific approaches. To determine steps DOD has taken to determine the effectiveness of air support contracts, we reviewed contract documentation that detailed contract requirements,

⁷Boito, Michael, Edward G. Keating, John Wallace, Bradley DeBlois, Ilana Blum, *Metrics to Compare Aircraft Operating and Support Costs in the Department of Defense*, (Santa Monica, CA: RAND Corporation, 2015).
https://www.rand.org/pubs/research_reports/RR1178.html.

⁸For the Air Force, we selected the F-15E, F-16, and F-35A. For the Navy and Marine Corps, we selected the F/A-18D and the F-35B.

such as performance work statements and quality assurance surveillance plans, and queried a federal database on contractor performance ratings.⁹ We also interviewed DOD component officials on the steps they take to monitor contractor performance. We also identified and reviewed ongoing studies by the Air Force, Navy, and Marine Corps that are evaluating options to modernize their respective adversary air training capabilities, including for the future role of air support contracts, and discussed these studies with relevant officials.

See Appendix I for a list of the offices that we contacted during our review.

We conducted this performance audit from August 2020 to December 2021 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on audit objectives.

Background

Adversary Air and Close Air Support Training

Prior to the Vietnam War, military pilots in training flew against others in similar aircraft using identical tactics. However, military pilots found that the capabilities of enemy aircraft they faced in combat differed markedly from what they faced in training. To communicate those lessons and train fighter pilots more realistically, the Air Force and Navy began programs of Dissimilar Air Combat Training. Within these programs, pilots acted as enemy air forces, training in adversary tactics and flying U.S. aircraft that

⁹We reviewed contractor assessments included in the Contractor Performance Assessment Reporting System. The Federal Acquisition Regulation provides policies and establishes responsibilities for recording and maintaining contractor performance information. FAR, 48 C.F.R. § 42.1500 (2013). The Regulation notes that past performance information is relevant information, for future source selection purposes, regarding a contractor's actions under previously awarded contracts or orders. FAR, 48 C.F.R. § 42.1501(a) (2019); *see also, e.g.*, 48 C.F.R. §§ 15.304(c)(3) (2020), 12.206 (1997). It is also used when evaluating a prospective contractor's responsibility. *See, e.g.*, FAR, 48 C.F.R. §§ 9.104-1(c), 9.104-6, 9.105-1(c) (2019). The Contractor Performance Assessment Reporting System is used by the government to assess various elements of contract performance such as quality of the product or service, schedule, cost control, management, and regulatory compliance.

most resembled expected adversaries and provided a more realistic image. Under then-classified programs, the Air Force also acquired actual foreign aircraft to better determine their characteristics.

The Air Force established aggressor squadrons that served this role, participating in large exercises and providing realistic training at various bases. In the 1980s, the Air Force operated four aggressor squadrons totaling 72 aircraft. However, according to an Air Force report, force drawdowns in the 1990s have resulted in a single squadron of F-16s (about 18 aircraft) supporting training primarily at Nellis and Eielson Air Force Bases (AFB). The squadron also includes a small number of F-15s.¹⁰ The Navy created adversary forces to help train pilots going through the TOPGUN senior fighter school, which continues today.¹¹

U.S. military forces have performed close air support in a range of military operations from permissive environments—such as in Afghanistan throughout Operation Enduring Freedom—to contested environments, such as in the initial stages of Operation Iraqi Freedom. The military services and SOCOM train forces, which include air controllers, to coordinate and integrate close air support on the battlefield, and train aircrews to employ close air support.¹² Air controllers comprise the group of forces involved in coordinating and integrating close air support.¹³ These forces are trained and equipped by the Army, Air Force, Navy, Marine Corps and SOCOM. The Air Force, Navy, and Marine Corps also organize, train, and equip aircrews to employ close air support within their roles as part of the joint force. As a result, there are a wide range of

¹⁰See United States Air Force, *Plan for Modernized Air Force Dedicated Adversary Air Training Enterprise* (March 2017).

¹¹In 1969, the United States Navy Fighter Weapons School (TOPGUN) was established to develop and implement a course of graduate-level instruction in aerial combat. According to the Navy, TOPGUN continues to provide advanced tactics training for FA-18A-F aircrews in the Navy and Marine Corps.

¹²We have previously reported on DOD's efforts to enhance capabilities that are used to identify friendly force locations during close air support missions and to evaluate the training provided to forces that coordinate and integrate close air support. We identified additional areas for improvement and made recommendations to strengthen these efforts. See GAO, *Close Air Support: Actions Needed to Enhance Friendly Force Tracking Capabilities and Fully Evaluate Training*, [GAO-21-99](#) (Washington, D.C.: Jan. 21, 2021).

¹³Among participants in close air support actions, joint terminal attack controllers are most often operating in a forward position with ground forces and direct the action of attack aircraft. For purposes of this report, we refer to these personnel when describing close air support contract activities.

aircraft across the Air Force, Navy, and Marine Corps that are used and equipped for training regarding close air support.¹⁴

Historical Use of Contracts to Provide Aircraft for Training

As militaries throughout the world modernized their air forces over the past two decades, private companies have taken advantage of the wide availability of surplus third- and fourth-generation fighter aircraft and high-performance jet trainers to procure these aircraft to provide air support training on a contractual basis.¹⁵

While the Navy has utilized air support services since the early 2000s, according to Navy officials, both the Navy and Air Force have subsequently entered into major contracts for adversary air. These services offer U.S. pilots the opportunity to fly against a diversity of aircraft types without the costs required to maintain a fleet of planes not otherwise in the military inventory. Using contractors to provide adversary air can also free up experienced uniformed pilots for other duties and has helped offset the shortage of military pilots, according to DOD officials.

Companies such as Draken International, TopACES, Discovery Air, Tactical Air Support, and Airborne Tactical Advantage Company initially provided services to foreign air forces whose smaller fleets did not permit establishing their own dedicated adversary forces. They subsequently expanded their offerings to larger militaries, including the U.S. military. As shown in Figure 1 below, these companies employ a variety of aircraft in their support of adversary air and close air support training, which has included providing the same model of aircraft to multiple military services.

¹⁴Not all services and SOCOM train the three types of forces that coordinate and integrate close air support. For example, the Army does not train soldiers that are assigned in special operations units that are air controllers. In addition, the Army does not consider its attack helicopters as close air support aircraft, although Army aircrews can conduct attacks using close air support tactics, techniques, and procedures during joint operations.

¹⁵Third generation fighters, developed in the late 1950s and early 1960s, included the F-4 Phantom, among others. The fourth generation fighter fleet includes F-16s, F-15Cs, and F-15Es, many of which were purchased in the 1970s, 1980s, and 1990s. DOD categorizes the F-22 and F-35 as fifth generation fighter aircraft.

Figure 1: Examples of Aircraft Used by Companies to Provide Contract Air Support Training



Sources: Counterclockwise from top Draken International LLC; ©2021 Airborne Tactical Advantage Company; Draken International LLC; Tactical Air Support; Draken International LLC; Tactical Air Support. | GAO-22-104475

In establishing air support contracts, DOD has used indefinite delivery/indefinite quantity contracts in most cases. These types of contracts provide for an indefinite quantity, within stated limits, of supplies or services during a fixed period, and may be used when the exact quantities and timing of supplies or services are not known at the time of contract award.¹⁶ In a multiple-award indefinite delivery/indefinite quantity contract, awards are made to two or more contractors under a single

¹⁶FAR, 48 C.F.R. § 16.504(a) (2020).

contract solicitation for the same or similar supplies or services.¹⁷ This allows DOD components to establish a group of preapproved contractors to compete for work under the contract, under streamlined ordering procedures, in response to a specific need. After the component determines the specific need, an order of services, via a task order, is placed with one of the contractors pursuant to procedures established in the contract. Except for obligations associated with the minimum guarantee, in general, amounts are not obligated on a contract—and work is not authorized—until a task order is issued for a particular location or training event.¹⁸ Typically, DOD established air support contracts through an initial base period of activity (generally, a “base year” or “base years”), with DOD components holding the option to continue the contracts for a set number of additional years (“option years”).

DOD Has Increased Its Use of Air Support Contracts to Address Some Training Requirements

Since fiscal year 2015, DOD components have increased the use of air support contracts, including contracting for more flying hours and expanding the number of training locations, to address some training requirements. The Air Force, Navy, and Marine Corps used air support contracts to replicate adversary air forces to train new fighter pilots or to support large-scale training exercises that prepare forces to deploy. For close air support training, some DOD components—including SOCOM—

¹⁷Generally, a contracting officer must, except for indefinite-quantity contracts for advisory and assistance services as provided in FAR section 16.504(c)(2), give preference to making multiple awards of indefinite-quantity contracts under a single contract solicitation for the same or similar supplies or services to two or more sources. FAR, 48 C.F.R. § 16.504(c) (2020).

¹⁸Where the quantity required under a contract is indefinite, the ultimate amount of obligations is determined by subsequent orders. However, the amount of any required minimum order specified in the contract must be recorded as an obligation upon execution of the contract. DOD 7000.14, *Financial Management Regulation*, vol. 3, ch. 8, *Standards for Recording and Reviewing Commitment and Obligations* (February 2020). An obligation is a definite commitment that creates a legal liability of the government for the payment of goods and services ordered or received, or a legal duty on the part of the U.S. that could mature into a legal liability by virtue of actions on the part of the other party beyond the control of the U.S. GAO, *A Glossary of Terms Used in the Federal Budget Process*, [GAO-05-734SP](#) (Washington, D.C.: Sept. 1, 2005).

have used these contracts during a variety of events to train air controllers.

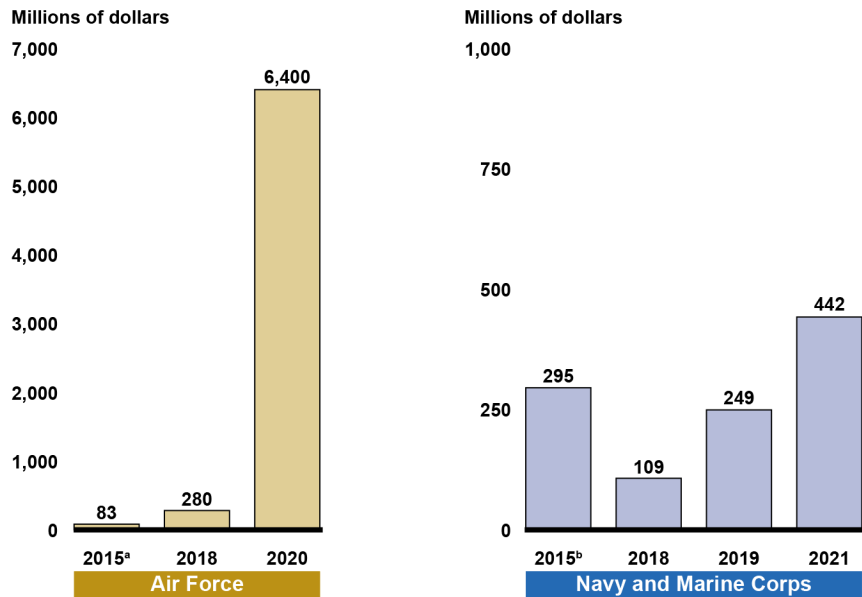
DOD Components Have Increased the Availability of Air Support Contracts for Flying Hours and Training Locations Due to Various Factors

DOD components have considerably increased the availability of air support contracts since fiscal year 2015, including awarding contracts for more flying hours and expanding the number of locations where the contracts are used.¹⁹ Based on our review of contract documentation, the Air Force, Navy, and Marine Corps awarded, modified, or extended contracts with a total maximum value of about \$380 million starting in fiscal year 2015. In fiscal year 2020, the Air Force awarded a contract with a maximum value of \$6.4 billion and the Navy and Marine Corps awarded contracts in fiscal years 2019 and 2021 with a total maximum value of almost \$700 million (see figure 2).²⁰ These contracts established the maximum amount of dollars that could be obligated under the contract, but the maximum values did not represent a commitment by the government to obligate the total maximum amount.

¹⁹Flying hours refer to the training hours necessary to train a pilot, while a sortie comprises a full live training event and are not equal to flying hours.

²⁰According to SOCOM officials, beginning in fiscal year 2015, special operations components of the Army, Air Force, and Navy also established smaller-scoped contracts to support approximately 3,700 flying hours of close air support training annually.

Figure 2: Total Maximum Value for Air Support Contracts Awarded by the Air Force, Navy, and Marine Corps, Fiscal Years 2015—2021



Source: GAO analysis of Department of Defense (DOD) documentation and interviews with DOD officials. | GAO-22-104475

Accessible Data Table for Figure 2 (Part 1 of 2)

Air Force

Year	Millions of dollars
"2015	83
"2018	280
"2019	6400

Accessible Data Table for Figure 2 (Part 2 of 2)

Navy and Marine Corps

Year	Millions of dollars
"2015	295
"2018	109
"2019	249
"2021	442

^aIn 2015, the Air Force initially awarded a contract for adversary air training with a maximum value of almost \$4.5 million. In fiscal year 2017, the Air Force modified and extended this contract with a modified contract maximum value of almost \$83 million. This figure displays information about the extended and modified contract.

^bIn 2015, the Navy initially awarded this contract for adversary air training with a maximum value, including all options, of approximately \$223 million. In later fiscal years, the Navy modified this contract several times. This figure displays information about the contract as fully modified.

Beginning in fiscal year 2015, the Air Force awarded a series of contracts to support adversary air training. It awarded an initial single year contract

to a single contractor for adversary air training at Nellis AFB with a maximum value of almost \$4.5 million. In fiscal years 2017 and 2018, the Air Force modified and extended the original contract and then awarded a larger follow-on contract to the same contractor at Nellis AFB, with maximum values of almost \$83 million and \$280 million, respectively. These contracts provided support for combat readiness training for the Air Force Weapons School, operational test missions, Red Flag exercises, among other training activities.²¹ In fiscal year 2020, the Air Force awarded a contract with a maximum value of \$6.4 billion to seven contractors known as the Combat Air Force/Contracted Air Support (CAF/CAS) contract. The CAF/CAS contract considerably increased the number of available flying hours and training locations for contract air support services (see table 1).

Similarly, the Department of the Navy awarded contracts to support adversary air training. In fiscal year 2015, it awarded a contract, which, after several modifications over following fiscal years, had a maximum value of nearly \$295 million for training at four locations, and in fiscal year 2018 awarded a separate contract for training at Naval Air Station Fallon in Nevada with a maximum value of nearly \$109 million. To expand contract support for adversary air training, the Department of the Navy awarded a 5-year contract with a maximum value of nearly \$442 million beginning in fiscal year 2021. This contract is for training at additional locations, including Virginia, California, Hawaii, and Japan to support an additional 42,750 flying hours.

Table 1 provides details for Air Force and Navy and Marine Corps air support contracts awarded from fiscal years 2015 through 2021, which includes increases in the contract maximum value, number of available flying hours, and number of training locations.²²

²¹According to the Air Force, the Air Force Weapons School trains weapons officers and enlisted personnel as tactical system experts and weapons instructors, among other responsibilities. According to the Air Force, Red Flag is the U.S. Air Force's premier air-to-air combat training exercise, providing aircrews the experience of multiple, intensive air combat sorties in a training environment. The second major phase of the Air Force's pilot training occurs in a formal training unit. This phase occurs after undergraduate pilot training and prior to completing mission qualification training.

²²Data in the table show the total amount of available flying hours and training locations for the contract in the fiscal year it was awarded. The numbers do not reflect the cumulative total of the available flying hours or number of training locations available across all contracts in a fiscal year, which would be greater.

Table 1: Summary of Increases in Number of Flying Hours and Operating Locations for Air Support Contracts Awarded by the Air Force, and Navy and Marine Corps, Fiscal Years 2015—2021

Military service ^a	Contract award fiscal year	Air support service type	Air support contracts			
			Contract maximum value (approx.)	Number of available flying hours ^b	Number of training locations ^b	Contract length ^c
Air Force	2015 ^d	Adversary air	\$83 million	10,208	1	3-year base + 1-year option
	2018	Adversary air	\$280 million	16,800	1	3-year base + two 1-year options
	2020	Adversary air /close air support	\$6.4 billion	Adversary air: 40,000 Close air support: 10,000	12 9	5-year
Navy/Marine Corps	2015 ^e	Adversary air	\$295 million	19,600	4	1-year base + 4-year options + 6-month possible extension
	2018	Adversary air	\$109 million	11,700	1	5-year
	2019	Close air support	\$249 million	n/a ^f	3	5-year base + 5-year option
	2021	Adversary air	\$442 million	42,750	4	5-year

Source: GAO analysis of DOD documentation and interviews with DOD officials. | GAO-22-104475

^aAccording to SOCOM officials, special operations components of the Army, Air Force, and Navy also established smaller-scope contracts to provide approximately 3,700 flying hours of close air support training annually.

^bNumber of available flying hours and training locations reflect the total amount for the contract in the fiscal year it was awarded. The numbers do not reflect the cumulative total of the available flying hours or number of training locations available across all contracts in a fiscal year, which would be greater.

^cDOD typically established air support contracts with an initial base period of activity (generally “base year” or “base years”), with DOD components holding the option to continue the contracts for a set number of additional years (“option years”).

^dIn 2015, the Air Force initially awarded a contract for adversary air training with a maximum value of almost \$4.5 million. In fiscal year 2017, the Air Force modified and extended this contract with a modified contract maximum value of almost \$83 million. This table displays information about the extended and modified contract.

^eIn 2015, the Navy initially awarded this contract for adversary air training with a maximum value, including all options, of approximately \$223 million. In later fiscal years, the Navy modified this contract several times. This table displays information about the contract as fully modified.

^fThis contract has a total maximum value of \$249 million for air controller training with no specific flying hours or sorties identified.

Air Force and Navy officials that manage air support contracts told us that various factors have resulted in the increased use of air support contracts, including:

- **Reduced capabilities to perform maintenance.** According to these officials, in recent years, maintenance units for U.S.-based squadrons

have been consistently crewed below their authorized levels.²³ Air Force officials told us these shortfalls in maintenance personnel limited their ability to produce the number of military aircraft needed for training.

- **Pilot retention.** These officials also noted that, because of lower numbers of fighter pilots, the military services have been unable to staff all authorized operational fighter pilot positions, resulting in a shortage of pilots available to fly as instructors in military aircraft.²⁴
- **Availability of aircraft for high-level training.** Air Force and Navy officials noted that air support contracts fill lower-level training requirements that saves use, wear, and tear on military aircraft that can be used for other, more high-level training events, such as large-scale training that occurs during the Air Force's Red Flag exercises.

In addition, the officials we spoke to told us that another factor they consider in using air support contracts is the potential cost-effectiveness of using contractor aircraft to conduct certain types of training.²⁵

Air Force and Navy Have Used Contracts to Replicate Adversary Air Forces and to Support Large-Scale Training Exercises

The Air Force and Navy have used air support contracts that replicate adversary air forces to meet service-training goals. The Air Force prioritized its largest contract for training at various operating locations to produce more new fighter pilots, while the Navy prioritized its contracts to support large-scale training exercises, according to our review of contract documents and interviews with service officials. Specifically,

- In fiscal year 2020, the Air Force obligated almost \$117 million for its CAF/CAS contract for 9,004 flying hours at six training base locations,

²³We have previously reported on Air Force experienced aircraft maintainer shortages. See GAO, *Military Personnel: Strategy Needed to Improve Retention of Experienced Air Force Aircraft Maintainers*, [GAO-19-160](#) (Washington, D.C.; Feb. 5, 2019).

²⁴We have previously found that the Air Force, the Navy, and the Marine Corps had gaps between the number of fighter pilots and funded positions in fiscal years 2013 through 2017. See GAO, *Military Personnel: DOD Needs to Reevaluate Fighter Pilot Workforce Requirements*, [GAO-18-113](#) (Washington, D.C.; Apr. 11, 2018).

²⁵In appendix II, we present information about costs for military aircraft and contractor aircraft that provide air support training.

which is anticipated to produce an estimated 51 additional fighter pilots.²⁶ Air Force officials noted air support contracts were also used to support large-force exercises, such as Red Flag, and to augment its military adversary air squadrons at Nellis AFB.

- According to Navy officials, it prioritized these contracts to support exercises involving fleet training events.²⁷ Navy officials told us they were committed to primarily funding air support contracts for fleet training, which included pre-deployment training events and exercises and follow-on training that did not require high-capability aircraft. The use of air support contracts for other training priorities have been funded on a case-by-case basis, according to Navy officials.

Figure 3 provides a map of the operating locations where the Air Force, Navy, and Marine Corps have contracted for adversary air training since fiscal year 2015.

²⁶These training base locations, and the associated aircraft platforms the new fighter pilots were trained for, include Kingsley Field Air National Guard Base (F-15C), Luke AFB (F-35), Holloman AFB (F-16), Eglin AFB (F-22 and F-35), and Seymour Johnson AFB (F-15E). Obligations data were provided by Air Force officials.

²⁷According to Navy officials, the Commander of Naval Air Forces categorized training exercises into three priority levels, called tiers, to receive contracted air support. Tier One includes pre-deployment training events and exercises and follow-on training that does not require high-capability aircraft. Tier Two includes non-fleet exercises. Tier Three includes fleet replacement squadrons, TOPGUN, and unit-level training exercises that require higher-capability aircraft.

Figure 3: Air Force, Navy, and Marine Corps Primary Operating Locations for Adversary Air Training Contracts Awarded Since Fiscal Year 2015



Source: GAO analysis of Department of Defense (DOD) data and interviews with DOD officials; Map Resources (map). | GAO-22-104475

Note: The figure depicts the primary operating locations established by the adversary air training contractors. According to Navy officials, the contractor also established detachments to support training at other locations, which are not depicted on the figure.

DOD Components Have Used Contracts to Train Air Controllers on Close Air Support Procedures

DOD components—including special operations components of the Army, Air Force, and Navy—have used air support contracts to provide aircraft to train joint terminal attack controllers²⁸ on close air support procedures

²⁸Joint terminal attack controllers most often operate in a forward position with ground forces and direct the action of attack aircraft engaged in close air support.

for air controller certification and qualification training events.²⁹ For example:

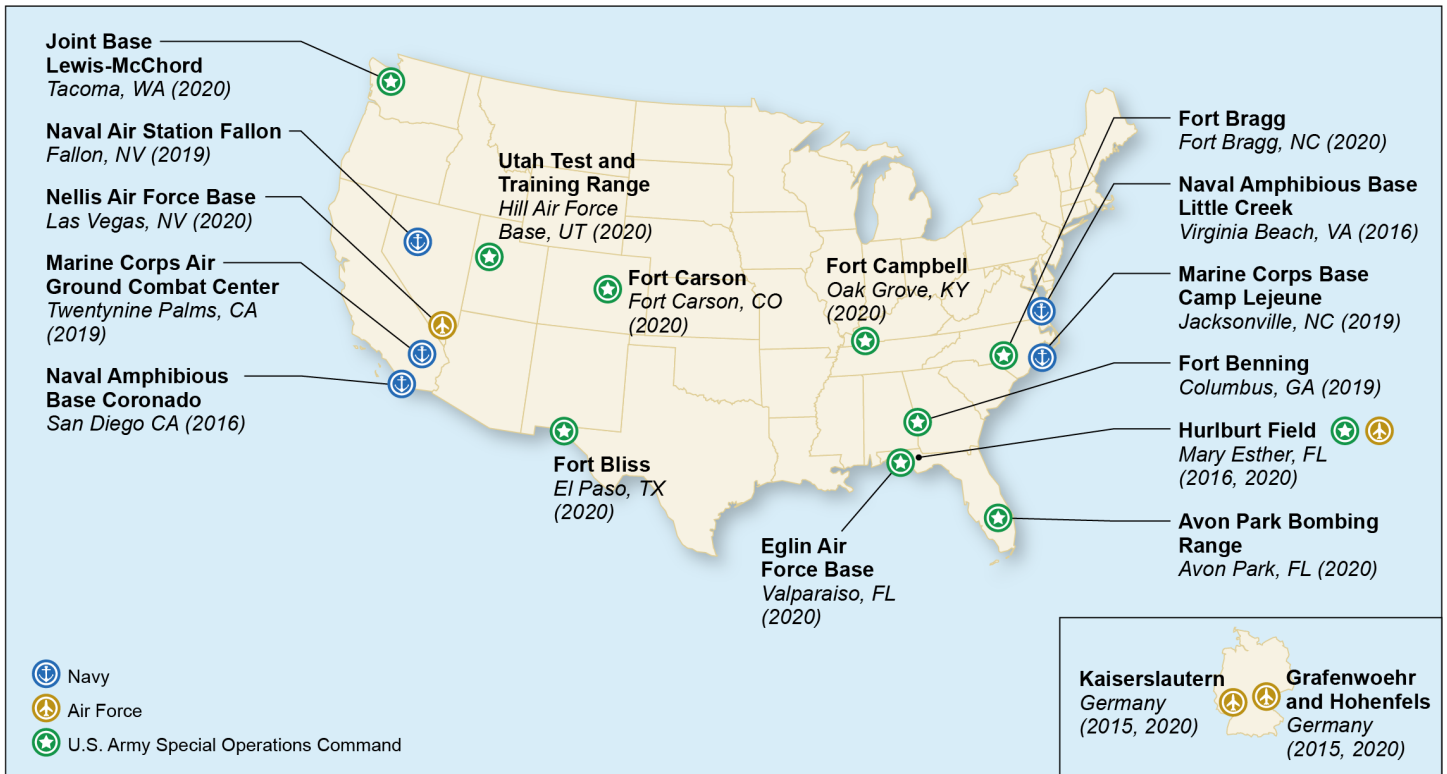
- The 5-year CAF/CAS contract awarded in fiscal year 2020 is intended to provide contracted close air support necessary for approximately 10,000 flying hours annually of close air support training to joint terminal attack controllers from the 6th Combat Training Squadron and Air Force Special Operations Command, and can provide aircraft to support training at nine Army bases.³⁰
- In fiscal year 2019, the Navy awarded a contract for aircraft for close air support training and an unspecified number of flying hours to naval special warfare air controllers at locations in North Carolina, California, and Nevada.
- According to SOCOM officials, special operations components of the Army, Air Force, and Navy have contracts to support approximately 3,700 total flying hours of close air support training annually. Training locations for these contracts include North Carolina, Kentucky, Nevada, Florida, and Washington.

Figure 4 provides a map of the operating locations where DOD components have contracted for close air support training since fiscal 2015.

²⁹DOD has developed minimum training standards for joint terminal attack controllers to attain initial certification and maintain qualification (i.e., sustainment training). In order to become a certified joint terminal attack controller, a trainee must complete an accredited joint terminal attack controller academics program and demonstrate proficiency in a number of training tasks through evaluation by a qualified instructor, among other requirements. In order to maintain qualification, a joint terminal attack controller must complete certain currency training, which includes completing a minimum number of training events on a semiannual basis, among other requirements. For both certification and qualification training, an air controller is required to train with an actual aircraft.

³⁰Later in this report, we describe the Air Force's efforts to achieve efficiencies in the use of air support contracts, including the use of close air support under the Air Force's larger CAF/CAS multiple award contract.

Figure 4: DOD Component Primary Operating Locations for Close Air Support Training Contracts Awarded Since Fiscal Year 2015



Source: GAO analysis of Department of Defense (DOD) data and interviews with DOD officials; Map Resources (map). | GAO-22-104475

DOD Components Have Taken Steps to Gain Greater Efficiencies and to Determine the Future Role of Air Support Contracts

DOD components have taken several steps to gain greater efficiencies in the use of air support contracts, including: (1) implementing changes in approaches to contracting, (2) establishing partnerships among DOD components, and (3) consolidating contract administration. Also, DOD components have established a process in line with DOD guidance to monitor the performance of contractor-provided training to meet established training requirements. Further, the Air Force, Navy, and Marine Corps are evaluating the role of air support contracts as part of ongoing reviews of future options for their adversary air training programs.

Air Force and Navy Have Implemented Several Approaches to Achieve Efficiencies in Air Support Contracts

The Air Force and Navy have implemented several steps to gain greater efficiencies in the use of air support contracts. We identified actions the military services have taken to increase the capacity of air support during training events, enhance training capabilities, and achieve other administrative benefits.

Changes in Contracting Approach to Increase Capacity: The Air Force and Navy have evolved their approach to contracting over time by adjusting the terms of the contracts to increase capacity for both adversary air and close air support training, provide industry with more confidence in sustained requirements for these services, and increase competition.

As an initial approach to contracting for air support services, the Air Force in 2015 first awarded a contract to a single contractor. According to a 2017 Air Force report to Congress, this approach was intended to serve as a test case for a long-term contractual solution, inform contractual oversight and requirements, and identify actions needed to integrate contractors into daily operations. The report noted the approach was also intended to generate market competition for follow-on contracts.³¹ For example, the Air Force awarded its first adversary air contract as a trial contract for a base-year to a contractor at Nellis AFB in Las Vegas, Nevada, in 2015. The Air Force then modified and extended this contract for another two years. Similarly, in 2015, the Navy awarded a single-year contract with options to extend for fleet support, or air-to-ship training, in the adversary air program. According to Navy officials, the Navy later issued a task order under the contract that provided adversary air-to-air training at Naval Air Station Fallon in Nevada.

As a next approach, the Air Force and Navy entered into multiyear contracts after assessing long-term training gaps. For example, the Air Force awarded a multiyear adversary air contract to the same contractor in 2018 to continue to fill training capacity at Nellis AFB. Also, the Navy, in

³¹United States Air Force, *Plan for Modernized Air Force Dedicated Adversary Air Training Enterprise* (March 2017). The Air Force provided this report to the congressional defense committees in response to section 350(c) of the National Defense Authorization Act for Fiscal Year 2017. Pub. L. No. 114-328, § 350(c) (2016).

2018, awarded a multiyear contract to a single contractor for both adversary air-to-air and air-to-ship training to address the continued need for training capacity.

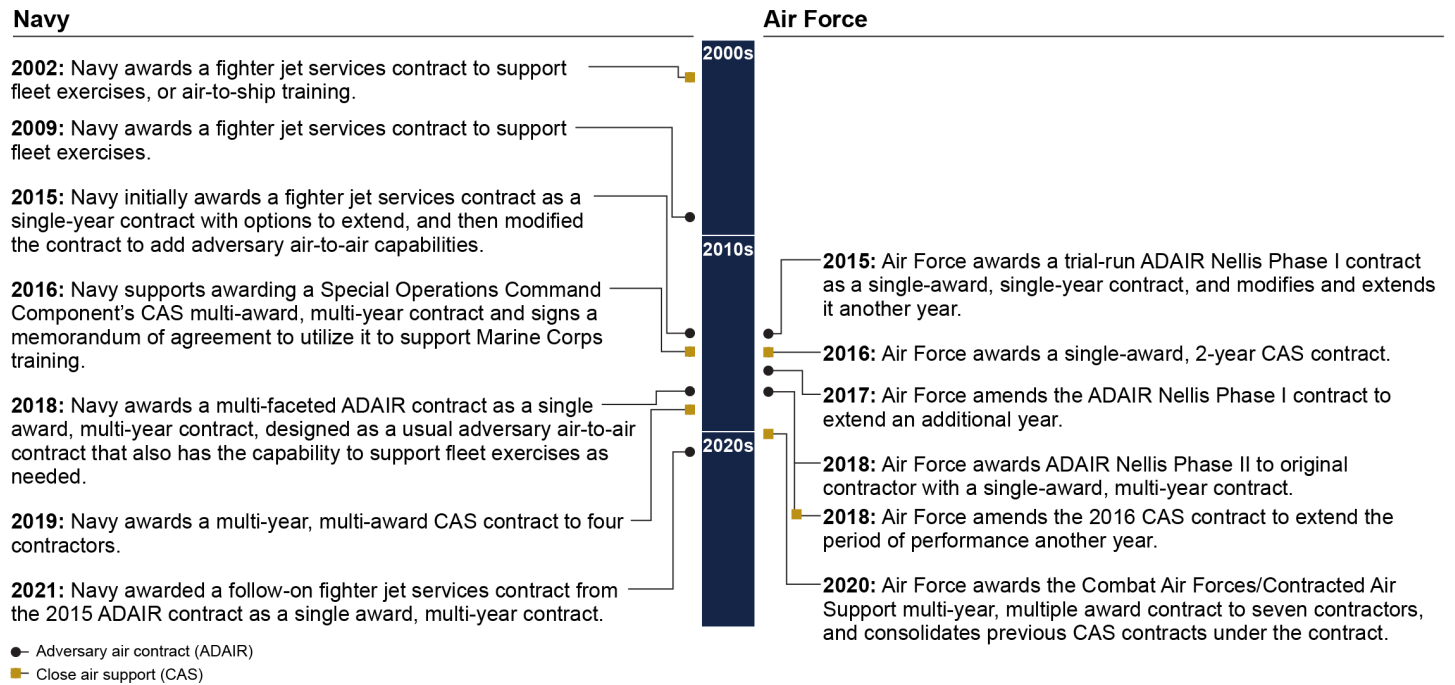
The Air Force and Navy entered into longer contract commitments in fiscal years 2020 and 2019 respectively, by establishing multiyear multiple award air support contracts to multiple contractors. According to Air Force and Navy officials, this would ensure contracted support for the near future and support the commercial industry and create competition, which would in turn increase quality while lowering costs to the government. For example, in fiscal year 2020 the Air Force awarded a multiyear multiple award contract to seven companies to fulfill its CAF/CAS training requirements. This contracting approach, described in the Air Force's Plan for Modernized Air Force Dedicated Adversary Air Training Enterprise, allowed the Air Force to generate market competition in the commercial industry—helping it to grow to meet DOD demand—and recent solicitations have seen competition among multiple companies.³²

In 2019, the Navy awarded its own multiyear multiple award contract providing for its close air support training requirements to several contractors for training in multiple locations including California, Nevada, and North Carolina.³³ Figure 5 presents a timeline of contracts used by the Navy and Air Force to provide training for adversary air and close air support.

³²United States Air Force, *Plan for Modernized Air Force Dedicated Adversary Air Training Enterprise* (March 2017).

³³Prior to this multiple award contract for close air support training, the Navy conducted its close air support training under a Marine Corps contract and a SOCOM component contract.

Figure 5: Timeline of Navy and Air Force Close Air Support and Adversary Air Forces Contracts, Fiscal Years 2002-2021



Source: GAO analysis of Department of Defense (DOD) information and interviews with DOD officials. | GAO-22-104475

Partnerships to Increase Capacity and Capability: DOD components have partnered to share information on and expand access to air support contracts. For example, after the Air Force and Navy decided not to pursue a joint adversary air contract due to differing schedules and training requirements at the time, according to Air Force and Navy officials they still recognized an opportunity to work together. Accordingly, they established a knowledge-sharing Service Acquisition Workshop in 2016, where Navy officials shared their previous experience with air support contracting. This knowledge-sharing would help inform what would eventually become the Air Force's CAF/CAS contract, according to Air Force and Navy officials.

Further, the Air Force has sought opportunities to expand its air support contract for use by other DOD components. For example, the Air Force and Navy approved a memorandum of agreement in 2020 to provide the framework and concurrence for the Navy to utilize the Air Force's 2019 CAF/CAS multiple award contract to meet adversary air requirements by

issuing task orders against the contract.³⁴ At the time of our work, the Navy was in the process of issuing their own task order for adversary air training against the CAF/CAS multiple award contract, according to officials.³⁵

Consolidation to Increase Administrative Efficiencies: The Air Force and Navy initiated actions to consolidate contract administration to more efficiently execute contracts and to reduce redundant spending. The Air Force consolidated their existing approach of using multiple air support contracts into a single multiple award contract, while the Navy consolidated their contracting efforts to a central contract office.

In fiscal year 2020, the Air Force consolidated its approach to adversary air and close air support contracting under the CAF/CAS multiple award contract management umbrella, according to our review of documentation and interviews with officials. According to Air Force officials, the consolidation was intended to create a centralized program that strategically utilized contractor aircraft across the Air Force.

The CAF/CAS consolidation has produced a number of positive outcomes, according to Air Force officials. For example:

- Air Force officials stated that by structuring the CAF/CAS multiple award contract for contractors to bid at the task order level, the competition has seen prices for close air support services decreased by an estimated 25 percent per flight hour.
- Air Force officials identified a reduction in travel costs by more than 50 percent by working with air support contractors in geographic areas near training base locations for training events.
- Air Force officials told us that consolidating Air Force contracts into the CAF/CAS multiple award contract has allowed for a reduced administrative burden on the training base locations by centralizing

³⁴*Memorandum of Agreement between Air Combat Command Acquisition Management and Integration Center and Department of the Navy Program Executive Office Aviation Common Systems and Commercial Services for the Combat Air Forces Contracted Air Support Program* (April 29, 2020). SOCOM components have also utilized contracts awarded by other components by issuing task orders against them to increase close air support training capacity.

³⁵According to Air Force officials, the Air National Guard and Army National Training Center have utilized the CAF/CAS contract, and the Navy have future plans to utilize it.

contract management and provided greater flexibility for these locations to use the contractor that best fits their needs.

In 2014, the Navy transitioned contracting for air support to a centralized contracting unit to realign work, which has since allowed for an increased focus on the airworthiness of the Navy's air support contractors, according to Navy officials. This step furthered the Navy's consolidation of air support contracting activities that began in 2005, which also achieved some efficiencies or other improvements, according to our review of Navy documentation and discussions with officials.³⁶

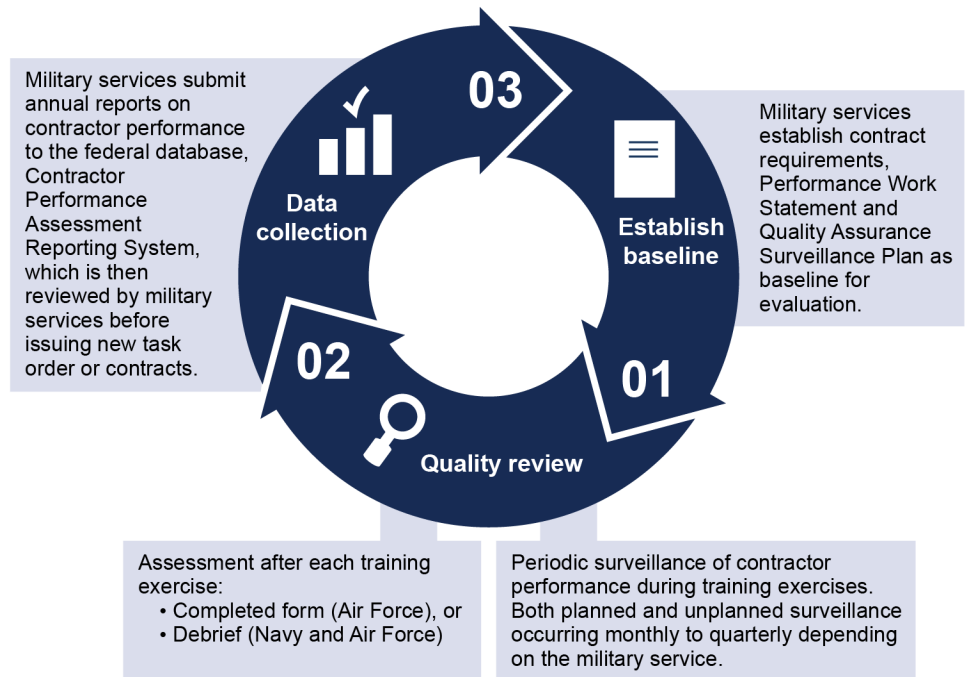
DOD Components Have Established Processes to Monitor the Performance of Air Support Contracts

DOD components have established a quality assurance process for monitoring the performance of air support contracts to meet contract requirements in line with DOD and service-level guidance.³⁷ This quality assurance process is intended to monitor that the contract-required aircraft with capabilities arrive at the agreed-upon location to perform specific training events over the requisite number of flying hours, according to our review of contract documentation and interviews with DOD officials. As shown in figure 6, the quality assurance process used by DOD components generally involves three key steps: (1) establishing a baseline through contract documentation, (2) monitoring performance through continual quality surveillance, and (3) collecting data through performance assessments.

³⁶In 2005, the Navy consolidated their contracting efforts for commercial air services to a central office—which was intended to increase coordination and standardize policy, issue timely contract award, and establish a common scheduling and funding system—according to our review of documentation and interviews with officials.

³⁷Department of Defense Instruction 5000.74, *Defense Acquisition of Services* (Jan. 10, 2020) (incorporating change 1, effective June 24, 2021), establishes policy, assigns responsibilities, and provides direction for the acquisition of services and authorizes DOD component heads to develop implementation guidance to support this issuance to best achieve cost, schedule, and performance objectives. Defense Contract Management Agency Instruction 8210.1C, Air Force Instruction 10-220, Army Regulation 95-20, Naval Air Systems Command Instruction 3710.1G, Commandant, United States Coast Guard Instruction M130.20.3A, *Contract's Flight and Ground Operations* (Aug. 21, 2013) (incorporating change 1, effective April 5, 2017), states that contract administration is performed to assure mission effectiveness, flight safety, and contractor compliance with Federal Acquisition and Defense Federal Acquisition Regulation Supplement clauses and other specific clauses which are cited in the contract.

Figure 6: DOD Quality Assurance Process for Assessing Contractor Performance



Source: GAO analysis of Department of Defense information. | GAO-22-104475

Additional information on each of the three steps is provided below.

Establish a baseline. The performance work statement and quality assurance surveillance plans, which accompanied every air support contract we reviewed, provided the baseline requirements for contractors to adhere to and established the quality assurance process for government officials and contractors to follow. The performance work statements we reviewed provided details on contract requirements for training, such as aircraft platform, maneuvers, training locations, and brief and debrief procedures. In addition, the performance work statements generally assigned contractor responsibility to establish and manage quality control programs and procedures to meet quality standards cited in the contract, and generally stated that government-led performance management reviews would be conducted.

The quality assurance surveillance plan is a government document used to manage contractor performance by ensuring that systematic quality assurance methods validate that the contractor’s quality control efforts

are timely and effective and are delivering the required results.³⁸ Quality assurance surveillance plans should be prepared in conjunction with the preparation of the statement of work and should be tailored to address the performance risks inherent in the specific contract type.³⁹ For example, the quality assurance surveillance plans we reviewed generally stated that they are intended to ensure the contractor performs in accordance with the performance metrics, the government receives the quality of services required under the contract, and that the actual performance results are documented in accordance with this plan. The quality assurance surveillance plans we reviewed also generally described how the government was to monitor and evaluate the contractor's performance, specifically including the performance metrics and frequency of surveillance.

Continuous quality review. According to our review of documentation and discussions with agency officials, continuous review of the quality of an air support contractor's performance has been achieved in several ways. First, contractors established an internal quality control program or plan to follow and analyze performance, as generally required in the performance work statements we reviewed. Government officials then conducted performance monitoring in two ways, which are described in the performance work statements and quality assurance documents:

- **Pre- and post-training mission briefs and debriefs.** The Navy, Marine Corps, and SOCOM components perform informal briefs and debriefs covering pre-mission objectives and post-mission successes. The Air Force also performs these briefings and, according to Air Force officials, completes a mission evaluation form after each training exercise that records government and contractor assessment of training mission success in meeting objectives.
- **Periodic planned and unplanned monitoring of contractor performance.** Military officials used performance requirements and metrics established in the contract documentation to conduct periodic on-the-ground monitoring to assess the contractor's performance in providing adversary air and close air support training. The assessments were used to track contractor performance and

³⁸DOD Defense Acquisition University, *Defense Acquisition Guidebook*, ch. 10 (Jan. 31, 2017) available at <https://www.dau.edu/tools/dag>.

³⁹FAR, 48 C.F.R. § 46.401 (2021); Defense Federal Acquisition Regulation Supplement, 48 C.F.R. § 237.172 (2021).

determine if immediate action should be taken to address any performance deficiencies.

The frequency of the air support contract surveillance depended on the DOD component and the type of contract, or at the military official's discretion and differs based on location, according to our review of the quality assurance documents. For adversary air contracts, both the Air Force and Navy conducted monthly assessments. Based on our review of contract documentation, air support contracts that provided close air support training generally provided for at least a quarterly report on the assessment of the contractor's performance.

Data collection. Military officials conducted an annual assessment of the contractor's overall performance, which is required by the Federal Acquisition Regulation and submitted as a past performance evaluation within the Contractor Performance Assessment Reporting System, a federal database.⁴⁰ Military officials provided a narrative assessment and rating of the contractor's performance from "unsatisfactory" to "exceptional" for, at a minimum, each of the following areas: technical (quality of product or service), cost control, schedule/timeliness, management, small business subcontracting, and other, as applicable.⁴¹ According to the Federal Acquisition Regulation, past performance shall be evaluated in all source selections for negotiated competitive acquisitions expected to exceed the simplified acquisition threshold, unless the contracting office documents the reason past performance is not an appropriate evaluation factor.⁴²

Officials from the Air Force, Navy, and SOCOM stated that based on their respective quality assurance processes, air support service contractors have generally met established contract requirements and performance expectations. Our review of DOD components' annual assessments of

⁴⁰The Federal Acquisition Regulation states that past performance evaluations shall be prepared at least annually and at the time work under a contract or order is completed. It also states that agencies shall prepare and submit all contractor past performance evaluations electronically in the Contractor Performance Assessment Reporting System. FAR, 48 C.F.R. §§ 42.1502(a), 42.1503(f) (2021).

⁴¹The Federal Acquisition Regulation defines each of the assessment ratings and provides examples of other factors to include, as applicable, such as failure to report in accordance with contract terms and conditions. FAR, 48 C.F.R. § 42.1503 (2021).

⁴²FAR, 48 C.F.R. § 15.304(c)(3) (2021). The Federal Acquisition Regulation defines the simplified acquisition threshold as \$250,000, with certain exceptions. FAR, 48 C.F.R. § 2.101 (2021).

contractor performance for adversary air and close air support training corroborated that contractors performed to at least a satisfactory level, based on the ratings recorded. More specifically, we reviewed a selection of 47 assessments of contractor performance for contracts for adversary air and close air support training from 2015 through 2020 and found that all contractors in the selection received ratings from “satisfactory” to “exceptional.”⁴³

DOD Components Have Initiated Efforts to Evaluate the Future Role of Air Support Contracts

During our review, the Navy and Marine Corps, and the Air Force, were in the process of determining the role of air support contracts as part of ongoing reviews of their adversary air training programs. According to military service documentation and agency officials, these reviews are intended to evaluate options to modernize their respective adversary air training capabilities and to meet the requirements for live air combat training and exercises.

The Navy’s ongoing Red Air, Training, and Proficiency for Aerial Combat review, for instance, is determining the optimum mix of training options for adversary air, including the right blend of Live, Virtual, and Constructive training.⁴⁴ Similarly, the Air Force’s ongoing Adversary Air Capabilities Development Plan is reviewing the service’s adversary air training program and, according to Air Force documentation, will offer a roadmap for the Air Force to fulfill its requirement of 90,000 training sorties per year without contractor support by 2030.

⁴³To determine the list of contractors awarded air support contracts by DOD, we requested DOD’s air support contracts for fiscal years 2015 through 2021. From those documents, we cataloged the list of contractors that were awarded air support contracts from fiscal years 2015 through 2021. We searched the Contractor Performance Assessment Reporting System database for performance assessments for each contractor and extracted a report for each contractor detailing their performance assessment ratings. We compiled the data and compared the contract number of each performance assessment to known DOD contract numbers to determine the relevant performance assessments. We then tallied the rating totals across the areas of performance review.

⁴⁴A live environment is defined as real people operating real weapons systems, the virtual environment is defined as real people operating simulated systems, and the constructive environment is identified as software models and code that are used to improve training scenarios with computer-generated entities—such as terrain, threats, aircraft, people, and vehicles, among others.

Both of these reviews have recognized that air support contracts have been used to help address shortfalls in existing adversary air capabilities and capacities, and that the contracts will likely be needed to some extent in the future as the services look to modernize their military adversary air capabilities. Preliminary results from these studies show that the services are pursuing some similar paths forward with some key differences. For instance, officials noted that the Navy currently uses air support contracts for adversary air training for specific training events, and as a supplemental resource if military aircraft are not available to fulfill training needs. According to Navy officials, preliminary findings from its ongoing review suggest that the Navy will continue to use air support contracts in the future to augment training gaps and rely on Navy units to determine when air support contracts best fit their training needs.

The Air Force's current adversary air program includes a mix of F-16 Aggressors, T-38A/Bs, units' own aircraft used for training, and air support contracts. According to an Air Force contracting official, air support contracts are used as a bridge until the Air Force adversary air program develops greater military capabilities to conduct training. The Air Force's plan shows that the use of air support contracts for adversary air training are expected to phase out in 2030 as the Air Force implements other training options with enhanced capabilities. Specifically, the Air Force plan states that it will replace air support contracts that provide adversary air capacity and bolster existing training capabilities through several lines of effort, including by reactivating formal aggressor squadrons. In addition, the Air Force is exploring options to acquire new manned and unmanned adversary air platforms in the future.

According to study documentation and discussions with service officials, several issues are being evaluated as part of these reviews, which will likely affect the direction of future investments. Air Force and Navy officials told us these services will continue to use air support contracts to augment gaps in capacity for training requirements as answers to these questions become more clear. These issues include:

- **Appropriate mix of training events and aircraft capabilities.** The Air Force and Navy are conducting in-depth assessments of the specific capabilities an aircraft requires to satisfy training requirements at different levels of pilot training (e.g., new fighter pilot training or mission-specific training).
- **Affordability.** Both the Navy and Air Force documentation and reports have stated that live adversary training has been and will

continue to be their priority and are looking to co-develop a future advanced jet trainer that could replicate some high-end threat capabilities at an affordable cost per flying hour. The services are also analyzing the affordability of dedicated manned and unmanned adversary air platforms to meet the demand for live air training, among other issues.

- **Timeframes.** The studies are also intended to provide roadmaps for the development of additional capabilities to close gaps in training capabilities and capacity and provide more advanced training by 2030.

According to officials, the Navy will complete its analysis in fiscal year 2022, and the Air Force will complete its review by the end of calendar year 2021.

Agency Comments

We provided a draft of this report to DOD for review and comment. DOD did not provide formal written comments. DOD provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to appropriate congressional committees; the Secretaries of Defense, Navy, and Air Force; the Commandant of the Marine Corps; the Commander of the U.S. Special Operations Command; and other interested parties. The report is also available at no charge on the GAO website at <http://www.gao.gov/>.

If you or your staff have questions about this report, please contact me at (202) 512-5431 or russellc@gao.gov. Points of contact for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix III.



Cary Russell
Director, Defense Capabilities and Management

Appendix I: List of Organizations Contacted During Our Review

To address all of our objectives, we interviewed officials and, where appropriate, obtained documentation, from the following organizations:

- Department of Defense
 - Office of the Under Secretary of Defense Comptroller
 - Office of the Under Secretary of Defense Personnel and Readiness
- United States Special Operations Command
 - J3 Operations – Ground, Maritime, Fires Branch
 - United States Army Special Operations Command
- Air Force
 - Headquarters United States Air Force
 - Combat Forces Division
 - Operations, Plans and Requirements
 - Readiness Division
 - Air Combat Command
 - Acquisition Management and Integration Center
 - Resources and Budget Division
- Navy
 - Commander, Naval Air Forces Atlantic
 - Naval Air Systems Command
 - Specialized and Proven Aircraft Program Office
 - Office of the Chief of Naval Operations
 - Air Warfare Division
- Marine Corps
 - Department of Aviation, Weapons Requirements Branch Tactical Air Control Party
- Congressional Budget Office

**Appendix I: List of Organizations Contacted
During Our Review**

-
- Defense, International Affairs, and Veterans' Affairs Cost Estimates Unit

Appendix II: Description of Costs for Military Aircraft and Contractor Aircraft That Provide Air Support

This appendix provides information on costs for military aircraft that are used for air support training and on various methods that the Department of Defense (DOD) uses to calculate cost per flying hour rates for various purposes. It also shows information about cost per flying hour rates for air support contracts that are used to replicate adversary air forces and provide aircraft for close air support training.

Military Aircraft Costs

Costs for military aircraft that provide air support during training encompass operating and support (O&S) costs. At the broadest level, O&S costs consist of all sustainment costs incurred from the initial system deployment through the end of system operations.¹ These O&S costs historically account for approximately 70 percent of the total life-cycle cost to operate and sustain an aircraft. A standard O&S cost-element structure is comprised of five major categories:

- unit-level staff (cost of operators, maintainers, and other support staff assigned to operating units, including contractor staff);²
- unit operations (cost of unit operating materiel, such as fuel, and training material, and unit support services);
- maintenance (cost of all system maintenance other than maintenance staff assigned to operating units, including organic and contractor maintenance);

¹DOD's Operating and Support (O&S) Cost-Estimating Guide provides direction to the service components on developing estimates of system O&S costs to support various analyses and reviews throughout the program life cycle. See DOD, Office of Cost Assessment and Program Evaluation, *Operating and Support Cost-Estimating Guide* (September 2020).

²DOD refers to "unit-level staff" cost as "unit-level manpower" cost.

- sustaining support (cost of system support activities other than maintenance that can be attributed to a system and are provided by organizations other than the system's operating units);
- continuing system improvements (cost of system hardware modifications and software support);

O&S costs are one of the four major life-cycle cost categories. The other cost categories are research and development costs; investment costs, consisting of procurement and military construction costs; and disposal costs. O&S costs do not include costs from these other categories.

Military Aircraft Cost Per Flying Hour Rates

Cost per flying hour (CPFH) is a metric used across DOD and is calculated as a military aircraft fleet's O&S costs divided by its flying hours. DOD does not use a single approach to determine CPFH rates for military aircraft. Rather, it uses three common methods to calculate CPFH rates and uses these methods for specific purposes:³

- **Operation and Maintenance (O&M) Cost per Flying Hour:** Used by the services to allocate resources in their respective Flying Hour Programs to achieve aircrew proficiency. This method uses a CPFH as calculated in DOD's Financial Management Regulation for budget formulation that is intended to include only costs that vary with flying hours.⁴ Flying Hour Program decision makers can use this method to assess the budgetary effects that incremental changes in flying-hour levels have on certain cost elements that vary with these changes. These cost elements include directly funded fuel, consumable materials and repair parts, and depot-level repairables.
- **DOD Cost per Flying Hour Reimbursable Rates:** Used to calculate reimbursement rates that are published each year in annual DOD

³Other methods to calculate CPFH rates exist for certain purposes. The information presented here is for illustrative purposes to show common methods used by DOD for determining CPFH rates. These methods were detailed in a 2015 Federally Funded Research and Development Center report. See Boito, Michael, Edward G. Keating, John Wallace, Bradley DeBlois, Ilana Blum, *Metrics to Compare Aircraft Operating and Support Costs in the Department of Defense* (Santa Monica, CA: RAND Corporation, 2015), https://www.rand.org/pubs/research_reports/RR1178.html.

⁴Specifically, the Financial Management Regulation provides a budget formulation exhibit, OP-20, for the services to use to calculate costs for their Flying Hour Programs. DOD 7000.14, *Financial Management Regulation*, vol. 2A, ch. 3, *Operations and Maintenance Appropriations* (December 2010).

Appendix II: Description of Costs for Military Aircraft and Contractor Aircraft That Provide Air Support

Fixed Wing and Helicopter Reimbursement Rates guidance and are used to charge DOD components and non-DOD customers for use of military aircraft on a per-flying-hour basis.⁵ These rates build upon the Flying Hour Program CPFH, adding in cost categories less directly affected by flying hours, such as depot-level maintenance costs.

- **O&S Costs per Flying Hour:** Used to compare a prospective new system and a legacy system. These comparisons are made using the average annual O&S costs between the systems. A key difference between the CPFH used for Flying Hour Program and Reimbursable Rates and the CPFH used to compare O&S costs of different aircraft programs is that comparisons across O&S intentionally include some cost categories that are fixed or do not vary with flying hours.⁶

Table 2 shows military service CPFH for fiscal year 2020 for selected aircraft for the Air Force, Navy, and Marine Corps by aircraft platform and DOD cost method.

Table 2: Military Service Cost per Flying Hour by Aircraft Platform, and Department of Defense (DOD) Cost Method for Fiscal Year 2020

Service	Aircraft platform	DOD cost method ^a		
		Operation and maintenance (dollars)	Reimbursable rate (dollars) ^b	Operating and support (dollars)
Air Force	F-15E	14,898	17,408	33,177
	F-16	8,315	9,054 ^c	26,937
	F-35A	5,730	16,952	37,989
Navy/Marine Corps	F/A-18D	18,718	18,048	56,216
	F-35B	3,809	16,904	55,523

Source: GAO analysis of DOD component data. | GAO-22-104475

^aDOD does not use a single approach to determine costs per flying hour (CPFH) rates for military aircraft. Rather, it uses three common methods to calculate CPFH rates and uses these methods for specific purposes. Each of these methods includes some, but not all, costs.

⁵E.g., DOD Deputy Comptroller (Program/Budget) Memorandum, *Fiscal Year (FY) 2020 Department of Defense (DoD) Fixed Wing and Helicopter Reimbursement Rates* (Oct. 28, 2019). Services utilize the guidance and format detailed in the Financial Management Regulation to collect these reimbursements. See DOD 7000.14, vol. 11A, ch. 6, *Annual Reimbursement Rates*, Appx. E, *Collections for Reimbursement of DOD-Owned Aircraft (Fixed/Rotary Wing)* (November 2019).

⁶Cost categories can be influenced by the number of flying hours. In the case of a cost category like fuel, the more hours flown, the more fuel is used, and thus fuel costs increase. Other cost categories that can vary with the number of flying hours can include depot-level reparables and engine-related costs. However, some cost categories are fixed, such as unit-level personnel, sustaining support, or modifications.

Appendix II: Description of Costs for Military Aircraft and Contractor Aircraft That Provide Air Support

^bWe are including the reimbursable rate for other DOD components. Reimbursable rates are different for non-DOD federal users, foreign military sales, and all other users.

^cFor the F-16, DOD reports Operation and Maintenance costs for the F-16 and its variants in a single cost. For Reimbursable Rates, DOD reports cost for each variant. For the purposes of this report, we show Reimbursable Costs for the F-16C for the Air Force.

Contractor Aircraft Costs

Contract costs are based on specific cost elements in the performance work statements, and include contractor overhead and other cost structures, defined as Contractor Line Item Numbers (CLIN) Costs. DOD components structured these CLINs for their respective contracts to reflect costs for aircraft capabilities, fuel, travel and mobilization to and from specific operating locations, and cancellations for scheduled training events. Accordingly, these costs vary with the number of flying hours flown for specific contract aircraft platforms, including the same aircraft platform used by different military services.

For air support contracts used for training to replicate adversary air forces and provide aircraft for close air support, DOD components stipulated specific aircraft capability and performance criteria, including speed and altitude, turning velocity, range, and minimum take-off to landing duration. The components paid contractors at varying rates per flying hour based on these criteria.

Other CLINs are paid on a per-unit basis. In the case of fuel, contractor aircraft are provided access to fuel at DOD bases and civil airfields during contract performance. Depending on the terms of the contract, rates for travel may include the temporary-duty cost for attending training required by a DOD component and participating in exercises that require an overnight stay away from a home base. Table 3 shows CPFH for fiscal year 2020 for contractor aircraft used by the Air Force, Navy, and Marine Corps by aircraft platform.

Appendix II: Description of Costs for Military Aircraft and Contractor Aircraft That Provide Air Support

Table 3: Contractor Cost per Flying Hour by Service and Contractor Aircraft Platform for Fiscal Year 2020

Service	Aircraft platform	Contract cost per flying hour (dollars)
Air Force ^a	F-5 ^b	16,800
	F-1 ^b	12,400
	L-159	9,100
Navy/Marine Corps ^a	F-5 ^b	11,500
	F-1 ^b	15,000
	Hawker Hunter	11,000

Source: DOD component data. | GAO-22-104475

^aAir Force Costs per Flying Hour for Adversary Air are from its Combat Air Forces/Contracted Air Support contract for fiscal year 2020, as reported by the Air Force. Navy and Marine Corps Costs per Flying Hour represent activity across their adversary air and close air support contracts for fiscal year 2020, as reported by the Department of the Navy.

^bCosts per flying hour vary with the number of flying hours flown for specific aircraft platforms, including the same aircraft platform used under contracts for more than one military service.

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the contact named above, Matthew Ullengren (Assistant Director), Anna Brunner, Adam Hatton, Amie Lesser, Kristin Petroff, Richard Powelson, and Carter Stevens made key contributions to this report.

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