



August 2016

# FORCE STRUCTURE

## Better Information Needed to Support Air Force A-10 and Other Future Divestment Decisions

# GAO Highlights

Highlights of [GAO-16-816](#), a report to congressional committees

## Why GAO Did This Study

DOD faces difficult decisions on how to best balance current demands and future needs within fiscal constraints. Decisions regarding the A-10 aircraft exemplify the difficulty. In the fiscal year 2015 budget request, DOD and the Air Force prioritized modern multi-role aircraft and proposed divesting the A-10 fleet, but Congress prohibited this action. DOD and the Air Force have continued to propose divesting the A-10 in two subsequent budget requests.

The National Defense Authorization Act for Fiscal Year 2015 included a provision for GAO to review the A-10 divestment proposal. This report reviews the extent to which (1) the Air Force and DOD have quality information needed to understand the implications of A-10 divestment; and (2) the Air Force followed best practices when estimating cost savings from A-10 divestment and evaluating alternatives. GAO analyzed agency documents and interviewed knowledgeable officials for this review.

## What GAO Recommends

With regard to the A-10, GAO recommends that the Air Force fully identify mission gaps, risks, and mitigation strategies, and also develop high-quality, reliable cost estimates of the savings from divestment before again proposing to divest its A-10 fleet, and that DOD establish quality information requirements to guide major weapon system divestments. DOD non-concurred with the recommendations, but GAO continues to believe that they remain valid as discussed in the report.

View [GAO-16-816](#). For more information, contact John H. Pendleton at (202) 512-3489 or [pendletonj@gao.gov](mailto:pendletonj@gao.gov).

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# Better Information Needed to Support Air Force A-10 and Other Future Divestment Decisions

## What GAO Found

The Department of Defense (DOD) and Air Force do not have quality information on the full implications of A-10 divestment, including gaps that could be created by A-10 divestment and mitigation options. While A-10 pilots are recognized as the Air Force experts in providing close air support (CAS) to friendly forces, the A-10 and its pilots also perform other missions that are important to ongoing operations or to combatant commander operational plans and divestment will result in reduced capacity and capability in these other areas. The Air Force is taking a number of steps to try to mitigate any potential negative impacts from its proposed A-10 divestments. However, the Air Force has not established clear requirements for the missions the A-10 performs, and in the absence of these requirements, has not fully identified the capacity or capability gaps that could result from the A-10 divestment. Without a clear understanding of the capability or capacity gaps and risks that could result from A-10 divestment, it is also unclear how effective or necessary the Air Force's and the department's mitigation strategies will be. For example, although the Air Force has several efforts underway to generally mitigate the loss of capabilities that would result from A-10 divestment, it has not identified how or if it will replace the A-10's role in combat search and rescue missions. Depending on the specific mitigation strategy chosen, the Air Force may have to address a number of different secondary impacts that could affect its ability to execute existing missions. The A-10 is one example of a challenge DOD could continue to face as it balances current needs against investing in the future force to replace aging systems. For example, in June 2014, GAO reported on a Navy challenge in balancing current capability and capacity with future modernization needs. Overall, the department does not have guidance to ensure that the services and DOD are collecting quality information to inform divestment decisions on major weapon systems before the end of their service lives. Without quality information that fully identifies gaps and associated risks resulting from divestment that can be used to develop mitigation strategies, DOD and the Air Force may not be well-positioned to best balance current demands and future needs.

According to the *GAO Cost Estimating and Assessment Guide*, a high-quality, reliable cost estimate is comprehensive, well-documented, accurate, and credible. GAO's analysis found that the Air Force's cost estimate for its fiscal year 2015 divestment proposal partially met best practices for being comprehensive, minimally met best practices for being well-documented and accurate, and did not meet best practices for being credible. Additionally, Air Force officials stated they used similar practices when developing fiscal years 2016 and 2017 budget requests that included A-10 divestment. As a result, the Air Force cannot ensure that it has a reliable estimate of the cost savings it would generate by divesting the A-10. Further, without developing a reliable estimate, the Air Force does not have a sound basis from which to develop and consider alternatives to achieve budget targets, such as making adjustments to other fighter-attack programs or mission areas like air superiority or global strike.

This is a public version of a classified report GAO issued previously. It excludes classified information which described specific intelligence assessments, scenarios, and operational details.

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**Abbreviations**

DOD	Department of Defense
CAS	Close Air Support
FAC(A)	Forward Air Controller (Airborne)
CSAR	Combat Search and Rescue
CFF	Counter Fast Attack Craft / Fast Inshore Attack Craft

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August 24, 2016

### Congressional Committees

The Department of Defense (DOD) continues to face difficult decisions regarding how best to address continuing operational demands while preparing for future challenges within fiscal constraints. An important aspect of this, across all of the military services, is determining an appropriate balance between maintaining and upgrading legacy weapon system platforms currently in operational use and procuring the platforms that will constitute the future force. Some of these legacy platforms are projected to have life spans into the next decade or beyond, so decisions to divest them in order to modernize the force can be contentious. One example of the department's attempts to strike this balance is DOD's and the Air Force's proposal, in the fiscal year 2015 budget request, to retire the A-10 fighter aircraft fleet in order to focus resources on modernization and multi-role aircraft that can operate in highly-contested environments. Facing a lower-than-expected budget level, the Air Force argued that an earlier-than-planned A-10 divestment would maximize cost savings with less risk compared to other force management alternatives, and that there were other aircraft that would continue to successfully conduct close air support (CAS) missions. CAS is one of a number of missions conducted by the Air Force. Air Force officials emphasized that, considering budgetary constraints and DOD strategy, A-10 divestment—though not a good choice—was the best option. Proponents of the A-10 argue that it is the most effective and least expensive aircraft for delivering CAS and other mission capabilities critical to ongoing operations in the Middle East, Europe, and Asia. Facing considerable opposition, the fiscal year 2017 DOD budget request proposed delaying the A-10 retirement in order to maintain capacity in support of current operations. Congress has thus far prohibited A-10 divestment.<sup>1</sup>

Section 133 of the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015 included a provision for us to conduct an independent study of the platforms used to carry out the

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<sup>1</sup>See Pub. L. No. 113-291, § 133 (2014) and Pub. L. No. 114-92, § 142 (2015), which prohibited the Air Force from obligating or expending funds to retire A-10 aircraft in fiscal years 2015 and 2016 respectively.

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CAS mission in light of the recommendation of the Air Force to retire the A-10 fleet.<sup>2</sup> We published our preliminary observations on Air Force A-10 divestment in June 2015.<sup>3</sup> Subsequently, the Senate Armed Services Committee, in its report accompanying a proposed bill for the National Defense Authorization Act for Fiscal Year 2016, included a provision for us to conduct a broader complementary study on DOD-wide CAS options.<sup>4</sup> This report addresses both requirements for us to conduct a DOD CAS options review and an A-10 review. We included in the scope of our review DOD's revised position on A-10 divestment in the fiscal year 2017 budget proposal. The objectives of this report are to review the extent to which (1) the Air Force and DOD have the quality information needed to understand the implications of A-10 divestment and (2) the Air Force followed best practices when estimating cost savings from A-10 divestment. In addition, we describe the process and priorities that led to the Air Force's fiscal year 2015 proposal to divest the A-10 and how DOD has evaluated options for redistributing CAS responsibilities, including the feasibility of transferring the A-10 fleet to the Army or Marine Corps, in appendixes I and II of this report.

To assess the extent to which the Air Force and DOD have the information needed to understand the implications of A-10 divestment, we reviewed a variety of DOD documentation that included strategic guidance, memorandums, A-10 squadron data, aircraft inventory projections, training syllabi, and test reports. We assessed the reliability of A-10 squadron divestment data by reviewing Air Force briefings that describe the divestment phasing of the A-10 squadrons by Air Force base and fiscal year and confirmed our interpretation of the data in these briefings with Air Force officials. We assessed the reliability of inventory projection data by comparing Air Force data with an inventory graphic from the Air Force's fiscal year 2017 budget briefing to Congress and discussed it with Air Force officials. We found both sources of data sufficiently reliable for our purposes of providing a general comparison of

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<sup>2</sup>See Pub. L. No. 113-291, § 133 (2014).

<sup>3</sup>GAO, *Force Structure: Preliminary Observations on Air Force A-10 Divestment*, [GAO-15-698R](#) (Washington, D.C.: June 25, 2015). We also briefed the congressional defense committees in April 2015.

<sup>4</sup>S. Rep. No. 114-49 at 213 (2015). In October 2015, we provided an oral briefing of preliminary findings to address this provision. At that time, the committee stated that it was flexible regarding how we would report our findings on DOD CAS options.

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the three recent A-10 divestment proposals and showing a general trend in Air Force-projected inventory. We compared this documentation to DOD guidance and GAO knowledge-based criteria,<sup>5</sup> which identify key factors for investment decisions that we applied to the divestment decision. These key factors include, among other things, having clearly defined and understood requirements to provide a baseline from which to identify gaps and their associated risks and inform decisions on how to best address the gaps.

To assess the extent to which the Air Force's estimate of A-10 cost savings followed best practices, we analyzed the Air Force's cost estimating approach against best practices found in the 2009 *GAO Cost Estimating and Assessment Guide*.<sup>6</sup> We collapsed the best practices in this guide into four general categories representing practices that help ensure a cost estimate is reliable: specifically, that it is (1) accurate, (2) well-documented, (3) comprehensive, and (4) credible.<sup>7</sup> We interviewed and obtained input from the Office of the Secretary of Defense (OSD), Cost Assessment and Program Evaluation; Office of the Under Secretary of Defense for Acquisition, Technology and Logistics; Office of the Director, Operational Test and Evaluation; Joint Staff; U.S. Central Command; U.S. European Command; U.S. Pacific Command; U.S. Forces Korea; U.S. Special Operations Command; and the U.S. Air Force, Army, Navy, and Marine Corps. To better understand training and operational issues relevant to the A-10, we met with units at Davis-Monthan, Nellis, and Osan Air Force bases, as well as the 175th Wing of the Maryland Air National Guard. We chose these locations based on factors such as the training and operational expertise resident in some of these locations and discussions with Air Force officials. Appendix III provides further details on our scope and methodology.

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<sup>5</sup>GAO, *Best Practices: Using a Knowledge-Based Approach to Improve Weapon Acquisition*, [GAO-04-386SP](#) (Washington, D.C.: January 2004). For details on how GAO has used these best practices in past reviews, see appendix III.

<sup>6</sup>GAO, *GAO Cost Estimating and Assessment Guide*, [GAO-09-3SP](#) (Washington, D.C.: March 2009).

<sup>7</sup>To develop the 2009 *GAO Cost Estimating and Assessment Guide*, GAO cost experts assessed measures applied by cost-estimating organizations throughout the federal government and industry and considered best practices for the development of reliable cost estimates. See [GAO-09-3SP](#).

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We conducted this performance audit from June 2015 to August 2016 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 our audit objectives.

This report is a public version of a classified report (GAO-16-525C) issued in July 2016. DOD deemed some of the information in the classified report secret (SECRET), Secret Not Releasable to Foreign Nationals (SECRET//NOFORN), and For Official Use Only (FOUO), which must be protected from public disclosure. Therefore, this report excludes SECRET, SECRET//NOFORN, and FOUO information and data, which described specific intelligence assessments, scenarios, and operational details. Although the information provided in this public report is more limited, it addresses the same objectives as the classified report and includes the same recommendations. Also, the overall methodology used for both reports is the same.

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## Background

The A-10 is a single seat fixed-wing platform specifically designed for close air support and defeating enemy armor. According to the Air Force, this fourth generation fighter<sup>8</sup> achieved its initial operational capability in 1977, but the aircraft has received many upgrades since that time, including a major modernization in 2007. The Air Force describes the A-10 as a highly accurate and survivable weapons-delivery platform with excellent maneuverability at low air speeds and altitude, a wide combat radius, and extended loiter times. Figure 1 shows a picture of an A-10.

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<sup>8</sup> The Air Force's fourth generation fighter and attack fleet is made up of F-16s, F-15s, and A-10s, many of which were purchased in the 1970s, 1980s, and 1990s.



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**Figure 1: A-10 from the Maryland Air National Guard's 104th Fighter Squadron**



Source: GAO. | GAO-16-816

As of April 2016, the Air Force A-10 inventory includes 283 aircraft stationed across the United States and also in South Korea, as shown in figure 2.

**Figure 2: A-10 Inventory and Basing Locations in the United States and South Korea**



Source: GAO analysis of Air Force information. | GAO-16-816

The Air Force assigns three primary missions and two secondary missions to the A-10, which are described in table 1.

**Table 1: A-10 Primary and Secondary Missions**

<b>Primary Missions</b>	<b>Description</b>
Close Air Support (CAS)	Air action by fixed-wing and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.
Forward Air Controller (Airborne) (FAC(A))	A specifically-trained and qualified aviation officer who exercises control from the air of aircraft engaged in CAS of ground troops. The FAC(A) also provides coordination and terminal attack control <sup>a</sup> for CAS missions, as well as locating, marking, and attacking ground targets using other fire support assets.
Combat Search and Rescue (CSAR)-Sandy	Tactics, techniques, and procedures performed by forces to recover isolated personnel from hostile or uncertain operational environments. The Sandy mission involves aircraft and pilots specifically trained to coordinate rescue action, escort helicopters on combat rescue missions, and suppress enemy forces.
<b>Secondary Missions</b>	
Counter Fast Attack Craft / Fast Inshore Attack Craft (CFF)	Fast Attack/Fast Inshore Attack Craft refers to groups of small boats using swarming tactics to attack maritime assets. CFF—the mission to counter them—is conducted in direct defense of maritime assets in the littoral or open ocean environment and requires increased integration between air and surface-delivered fires and the movement of maritime forces.
Air Interdiction	Air operations conducted to divert, disrupt, delay, or destroy the enemy’s military surface capabilities before they can be brought to bear effectively against friendly forces, or to otherwise achieve objectives that are conducted at such distances from friendly forces that detailed integration of each air mission with the fire and movement of friendly forces is not required.

Source: GAO analysis of DOD information. | GAO-16-816

<sup>a</sup>Terminal attack control is the authority to control the maneuver of and grant weapons release clearance to attacking aircraft.

The A-10 is one of a number of DOD aircraft—both manned and unmanned—that conduct the CAS mission. Besides the A-10, the Air Force currently has two other fighter aircraft that conduct the CAS mission (F-16 and F-15E) and plans to use the F-35 for this mission in the future.<sup>9</sup> The Air Force also uses bombers (B-1, B-52), special operations aircraft (AC-130), and remotely-piloted aircraft (MQ-1, MQ-9) to conduct CAS. Other DOD assets used for CAS include the F/A-18 (Navy/Marine

<sup>9</sup>The A-10, F-15E, F-16, and F-35 are part of the Air Force Global Precision Attack Core Function. Air Force activities and budgets are managed primarily across 12 Core Functions—the broad capabilities the Air Force provides to the combatant commanders. The 12 core functions are (1) Rapid Global Mobility, (2) Nuclear Deterrent Operations, (3) Building Partnerships, (4) Special Operations Forces, (5) Agile Combat Support, (6) Space Superiority, (7) Cyber Superiority, (8) Air Superiority, (9) Global Precision Attack, (10) Global Integrated Intelligence, Surveillance, and Reconnaissance, (11) Command and Control, and (12) Personnel Recovery.

Corps), AV-8 (Marine Corps), AH-1 (Marine Corps), and AH-64 (Army).<sup>10</sup> Figure 3 includes examples of CAS-capable aircraft in the Air Force and other services.

**Figure 3: Examples of Close Air Support (CAS)-Capable Aircraft**



Source: Department of Defense (DOD). | GAO-16-816

Joint Terminal Attack Controllers provide ground commanders with recommendations on the use of CAS and its integration with ground operations. According to Joint Doctrine, Joint Terminal Attack Controllers are qualified (certified) servicemembers who, from a forward position, direct the action of combat aircraft engaged in CAS and other offensive air operations.<sup>11</sup> FAC(A)s are also qualified to exercise control of aircraft engaged in CAS, but FAC(A)s exercise control from the air while Joint Terminal Attack Controllers typically exercise control from ground positions. In short, both are responsible for ensuring that aircraft strike the target accurately while avoiding hitting friendly troops. DOD and partner nations have Memorandums of Agreement that standardize Joint Terminal Attack Controller and FAC(A) certification and qualification requirements, including identifying minimum training and performance standards. Joint Terminal Attack Controllers and FAC(A)s are the only

<sup>10</sup>The Army classifies the AH-64 as a Close Combat Attack asset and does not consider its attack helicopters CAS systems. Although some Army aircrews may be proficient in CAS, Army attack aviation pilots use different tactics, techniques, and procedures than CAS pilots.

<sup>11</sup>Joint Chiefs of Staff, Joint Publication 3-09.3, *Close Air Support* (November 2014).

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personnel authorized to control the maneuver of, or grant weapons release clearance to, attacking aircraft.

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## Air Force and DOD Do Not Have Needed Information to Fully Understand Implications of A-10 Divestment and Could Face Similar Challenges with Future Divestments

The Air Force and DOD do not have needed information on the full implications of A-10 divestment, including the gaps that could be created by divestment and options for mitigating any potential gaps. Divestment decisions can have far-reaching consequences and should be based on quality information. The Air Force's recent proposal to postpone full A-10 divestment until 2022 mitigates some near-term capacity gaps, but divestment may still create capacity gaps and gaps in the service's ability to conduct missions currently carried out by the A-10. Moreover, the Air Force has not yet clearly identified gaps and resulting risks that could be created by A-10 divestment, so it is not well-positioned to determine appropriate mitigation strategies. Further, DOD may face similar decisions to divest other weapon systems before the end of their service lives in the future and does not have guidance to ensure that the services and the department overall are collecting quality information to inform these decisions.

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## Divestment Decisions Can Have Far-Reaching Consequences and Should Be Based on Quality Information

Because they can have far-reaching cost and operational consequences, major divestment decisions, like the original decisions to invest in platforms, should be based on quality information.<sup>12</sup> With regard to DOD's divestment actions that would affect military capabilities, this quality information should, among other things, clearly identify any gaps created by the action and strategies for mitigating any gaps that result from the action.<sup>13</sup> The Air Force has numerous policy documents to guide investment decisions; by contrast, it does not have guidance identifying the factors it must consider before choosing to divest a major weapon system before the end of its expected service life. Although the Air Force

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<sup>12</sup>GAO's *Standards for Internal Controls in the Federal Government*, [GAO-14-704G](#) (Washington, D.C.: September 2014) states that management should use quality information to make informed decisions.

<sup>13</sup>According to DOD, capability gaps result from factors including the lack of a fielded capability, insufficient capacity or proficiency for a fielded capability, or the need to replace a fielded capability to prevent a future gap. See Joint Chiefs of Staff, *Manual for the Operation of the Joint Capabilities Integration and Development System (JCIDS Manual)* (February 2015).

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lacks specific guidance to identify the factors it must consider before choosing to divest a major weapon system, the Air Force has guidance that recognizes that divestment decisions, like investment decisions, are actions that can have major financial and non-financial consequences for an organization and so should be carefully considered.<sup>14</sup> Similarly, we were not able to find DOD guidance specifically identifying such factors. However, DOD guidance and GAO knowledge-based criteria identify key factors that, while developed for investment decisions, are applicable to making divestment decisions.<sup>15</sup> One key factor is having clear requirements, which (1) provide a baseline to identify gaps and associated risks, and (2) inform decisions on how best to address the gaps. The Navy has also recognized the similarities between investment and divestment decisions, and it has issued guidance requiring that senior Navy leaders and Congress be provided specific information to support proposals to divest a vessel before the end of its expected service life.<sup>16</sup> Specifically, these proposals must describe the reason for the divestment, identify any resulting capability gaps, and recommend strategies for mitigating gaps.

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### Delay in A-10 Divestment Mitigates Near-Term Loss of Fighter Capacity but Risks May Remain

The Air Force's current A-10 divestment proposal delays loss in fighter capacity that would have occurred under prior proposals. If implemented, the current proposal would result in the complete divestment of the A-10 by 2022, 3 years later than proposed in the fiscal years 2015 and 2016 budget requests. The Air Force 2014 budget request anticipated retaining all 283 A-10s through at least 2035.<sup>17</sup> However, Air Force leaders have

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<sup>14</sup>Air Force Manual 65-510, *Business Case Analysis Procedures* (Sept. 22, 2010).

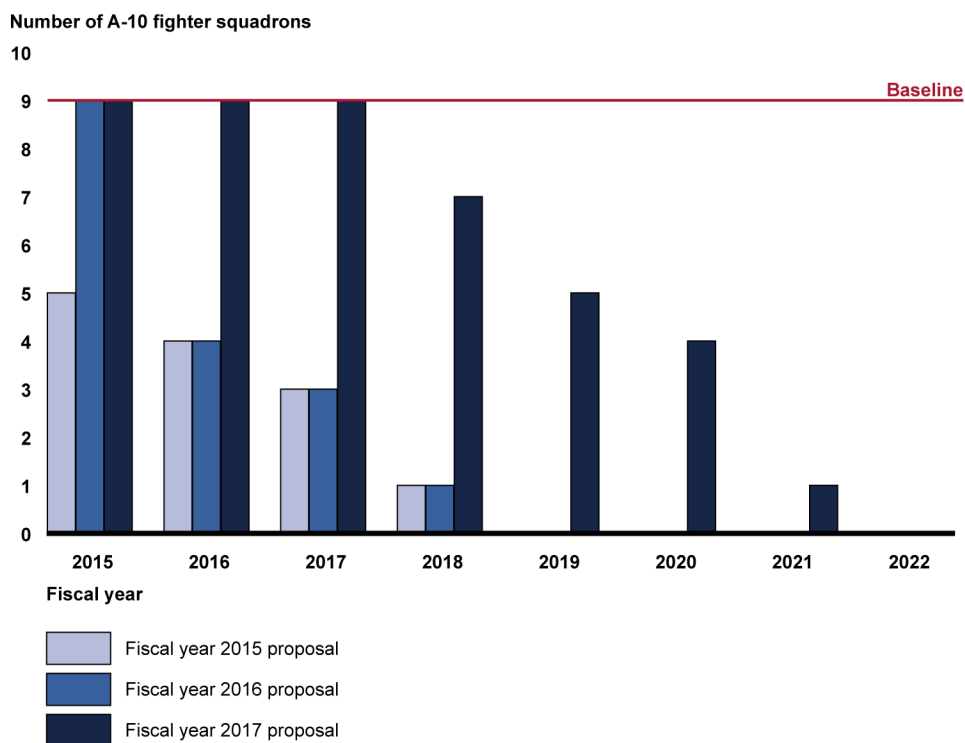
<sup>15</sup>See, for example, Department of Defense Instruction 7041.03, *Economic Analysis for Decision-making* (Sept. 9, 2015) and [GAO-04-386SP](#).

<sup>16</sup>Department of the Navy, OPNAVINST 4770.5H, *General Policy for the Inactivation, Retirement, and Disposition of U.S. Naval Vessels* (Apr. 24, 2014).

<sup>17</sup>Throughout much of fiscal year 2013, DOD and other federal agencies faced an uncertain budgetary environment, including the timing and extent of across-the-board spending reductions known as sequestration. For additional information, see GAO, *Sequestration: Documenting and Assessing Lessons Learned Would Assist DOD in Planning for Future Budget Uncertainty*, [GAO-15-470](#) (Washington, D.C.: May 27, 2015). Although the fiscal year 2014 budget request was under sequestration, the fiscal year 2015 budget request was the first one developed under sequestration, according to Air Force officials.

recently testified that the service must start divesting the A-10 fleet after fiscal year 2017 because, without an increase in personnel and associated funding, the Air Force does not have the manpower needed to support both the A-10 and F-35 fleets. Figure 4 provides a comparison of the 2015, 2016, and 2017 divestment proposals.

**Figure 4: Comparison of A-10 Fighter Squadron Divestment by Air Force Proposal**



Source: GAO analysis of Air Force information. | GAO-16-816

Note: Figure shows number of squadrons at the end of each fiscal year.

Changes in the current operational environment—specifically the rise of the Islamic State of Iraq and the Levant (ISIL) and Russia’s provocations—led to increased fighter aircraft demands and also affected the decision to temporarily defer A-10 divestment, according to the Air Force. This decision was made in consultation with the combatant commanders, according to Air Force testimony. Since the Air Force



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originally proposed divesting its A-10s, units have deployed to U.S. European Command (EUCOM), U.S. Central Command (CENTCOM), and U.S. Pacific Command. The A-10 brings useful and unique capabilities to the battlefield, according to officials from the commands.<sup>18</sup> The Secretary of Defense noted that the A-10 has been devastating ISIL.<sup>19</sup> Figure 5 shows A-10s returning from a deployment to EUCOM.

**Figure 5: A-10s Returning from Deployment to U.S. European Command**



Source: GAO. | GAO-16-816

Note: A-10s from the 354th Fighter Squadron returning to Davis-Monthan Air Force Base in August 2015 from a deployment to Europe in support of Operation Atlantic Resolve, European Command's operation to assure and defend allies, enhance allies' and partners' ability to provide their own security, and deter further Russian aggression.

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<sup>18</sup>Officials from EUCOM and CENTCOM stated that when they request forces they do not request specific fighter aircraft models; instead they make generalized requests and then find ways to leverage the unique capabilities they receive.

<sup>19</sup>DOD, *Remarks Previewing the FY 2017 Defense Budget: As Delivered by Secretary of Defense Ash Carter to the Economic Club of Washington* (Washington, D.C.: Feb. 2, 2016).



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Although the 2017 A-10 divestment proposal provides more near-term fighter capacity than the two prior proposals, implementation of this latest divestment proposal could still lead to near-term capacity gaps. According to a DOD summary of its fiscal year 2017 budget proposal, the Air Force plans to replace A-10 squadrons one-for-one with F-35 squadrons in order to mitigate the drop in fighter capacity projected under the original A-10 divestment proposal.<sup>20</sup> However, Air Force documentation reveals that the loss of A-10 squadrons will outpace the F-35 squadron gain, with eight A-10 squadrons divested by the end of the 5-year budget plan but only six F-35 squadrons stood up.

North Korea remains one of the most challenging security problems for the United States and its allies and partners in the region, according to DOD. DOD reports that North Korea's large, forward-positioned military can initiate an attack against South Korea with little or no warning.<sup>21</sup> In April 2015, the U.S. Forces Korea commander testified that having very little warning of a provocation was the command's top concern. In response to questions, the commander also stated that loss of the A-10 would create a gap, primarily in the ability to defeat the North Korean armor threat. He also testified that he had been assured that, should the A-10 unit based in South Korea be divested, it would be replaced by another squadron in South Korea. However, the current Air Force proposal would divest the A-10 squadron in South Korea in fiscal year 2019 without replacement.

We found that the full extent to which the divestment proposals create capacity gaps and increase risk is difficult to determine, because DOD does not have a clearly established Air Force fighter aircraft capacity requirement. However, all three A-10 divestment proposals would contribute to a decline in Air Force fighter capacity, when compared to the Air Force's fiscal year 2014 budget plans, which called for the Air Force to maintain its A-10s through 2035. In March 2016, the Air Force began a

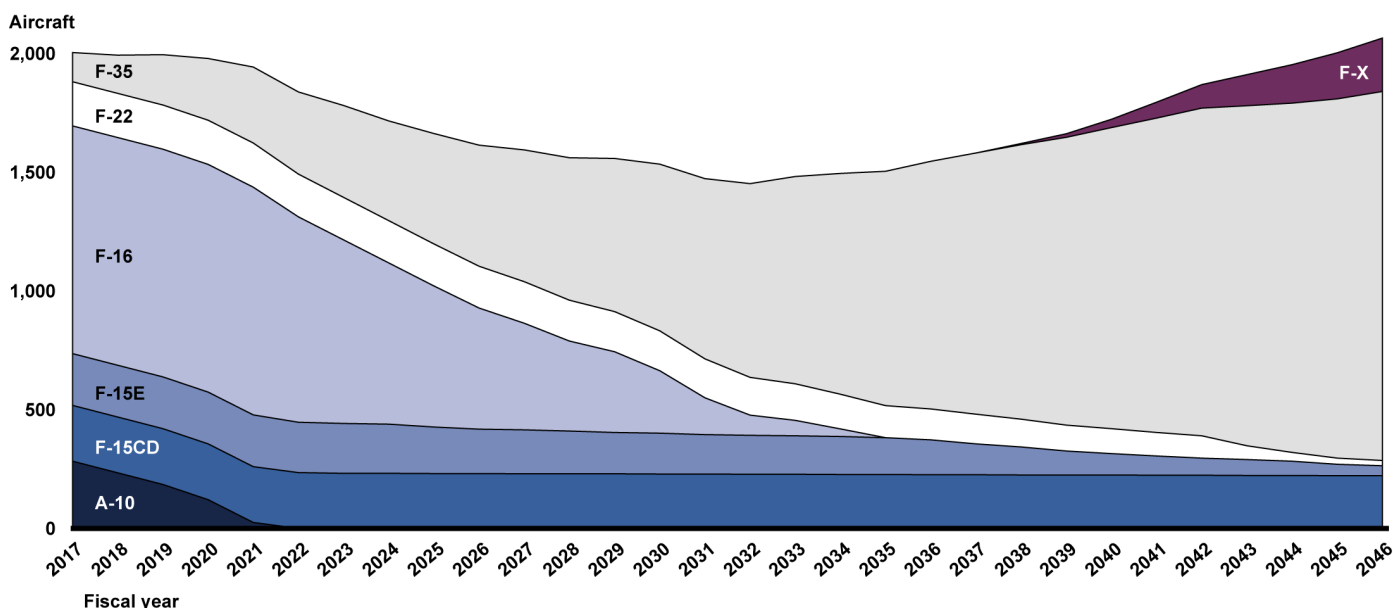
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<sup>20</sup>This assumes that the delivery schedules and operational capability declarations for the F-35 occur as scheduled. Since 2001, we have reported extensively on the F-35 program's cost, schedule, and performance problems. For the latest example, see GAO, *F-35 Joint Strike Fighter: Continued Oversight Needed as Program Plans to Begin Development of New Capabilities*, [GAO-16-390](#) (Washington, D.C.: Apr. 14, 2016).

<sup>21</sup> DOD, *Report to Congress: Military and Security Developments Involving the Democratic People's Republic of Korea* (Jan 2016).

major force structure review that will include an examination of its fighter capacity requirements, according to Air Force officials.<sup>22</sup> Until it has such a baseline, the Air Force cannot determine the full extent of capacity gaps and associated risks it will incur under its current A-10 divestment proposal and the effectiveness or necessity of any mitigation strategies. Figure 6 shows the Air Force’s planned fighter and bomber inventories from 2017 through 2046.

**Figure 6: Air Force Projections of Its Inventory from Fiscal Year 2017 to 2046**



Source: Air Force. | GAO-16-816

### Lack of Quality Information on Gaps in A-10 Missions Caused by Divestment Limits the Air Force’s Ability to Assess Mitigation Efforts

The Air Force has not comprehensively assessed potential mission capability gaps caused by A-10 divestment or the effects of divestment on its ability to support Joint Terminal Attack Controller training. Though the Air Force and DOD are taking steps to mitigate potential gaps, they have not established clear requirements for the missions that the A-10 performs, and in the absence of these requirements, have not fully identified the capability gaps and risks that could result from A-10

<sup>22</sup>The Air Force is planning on completing a draft summary report for this effort in November 2016 and a final report in March 2017.

Primary Mission – Close Air Support (CAS)

divestment and the effectiveness or necessity of the Air Force’s and the department’s mitigation strategies. The following sections provide summary information, based on our analysis, about the mission capabilities the A-10 and its pilots currently provide; about efforts to mitigate potential gaps that could result from A-10 divestment; and about the uncertainty of the effectiveness of mitigation efforts due to lack of quality information, such as specific mission requirements. The missions and A-10 contributions are discussed more expansively in appendix IV.

Over the last 12 years, ground commanders have relied primarily on air support rather than artillery or other ground-based systems for their combat fire support, according to the Joint Staff. CAS provides ground commanders with flexible and responsive support and, under some circumstances—including airborne assaults, counter-insurgency operations, and special operations—may be the only fire support available. Though many Air Force platforms have performed CAS in the past decade, A-10 pilots are considered the Air Force’s CAS experts due to the amount and depth of their CAS training that builds up over their careers. The A-10 CAS focus, which begins at initial qualification training and extends to yearly training and advanced training, far exceeds the CAS training of other Air Force pilots. According to Air Force and combatant command officials, the CAS expertise that resides in the A-10 community is particularly important in contested environments, such as Korea, where a wider skillset is needed to effectively provide CAS. Table 2 summarizes the CAS training flight (sortie) requirements for pilots of Air Force CAS-capable fighters along with the mission priority of CAS for each aircraft type.

**Table 2: Close Air Support (CAS) Pilot Training Requirements and Mission Priority by Aircraft Type**

	A-10	F-15E	F-16 (Block 25-42)	F-16 (Block 50/52)	F-35A
<b>Training requirements (numbers of sorties)</b>					
Initial qualification training	8	0	3	3	N/A <sup>b</sup>
Yearly training <sup>a</sup>	22	12	12	4	12
Advanced training <sup>c</sup>	9	3	4	4	N/A <sup>b</sup>
CAS mission priority	Primary	Primary	Primary	Secondary	Primary

Source: GAO analysis of Air Force information. | GAO-16-816

<sup>a</sup>Yearly sortie requirements listed are for active duty inexperienced pilots out of a total 108-sortie requirement. Yearly sortie requirements can vary by experience level (inexperienced/experienced) and by component (Active Component/Air National Guard/Air Force Reserve Component). Further,

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the Air Force notes that, as the F-35 matures, additional system capabilities will shift the balance of sorties and missions accordingly.

<sup>b</sup>N/A – Syllabus identifying sortie requirements not yet finalized.

<sup>c</sup>Advanced training is from the Weapons Instructor Course, which Air Force officials describe as graduate-level training for elite Air Force pilots.

The A-10 aircraft also has unique capabilities not replicated in other Air Force fighters such as the F-16 and F-35. CAS experts convened by the Air Force in 2015 concluded that A-10 divestiture creates a gap, because the Air Force is losing a high-capacity and cost-efficient ability to kill armor, moving, and close-proximity targets in poor weather conditions. However, CAS needs can vary considerably according to circumstances and in certain cases, different platforms have advantages over the A-10, according to Air Force officials. For example, a B-1 bomber has a longer loiter time and larger bomb capacity than the A-10, which is advantageous in some circumstances.

#### Primary Mission – Forward Air Controller (Airborne) (FAC(A))

Forward Air Controller (Airborne) (FAC(A)) pilots are CAS experts who help efficiently manage air-to-ground operations. Although largely not used during operations in Iraq and Afghanistan, FAC(A)s are invaluable during contested CAS operations because they perform reconnaissance and develop battlefield awareness under conditions where intelligence and communications will be much more limited, according to Air Force officials. FAC(A)s also play an important role in cases where there are not enough qualified Joint Terminal Attack Controllers authorized to control coalition and allied aircraft, according to Air Force officials. Though all DOD FAC(A)s are required to meet minimum training requirements for certification and qualification retention, as established in a memorandum of agreement,<sup>23</sup> Air Force FAC(A) training requirements are higher for A-

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<sup>23</sup>The FAC(A) Memorandum of Agreement 2015 was signed by representatives of the Joint Staff, Army, Air Force, Marine Corps, Navy, Special Operations Command, and the Royal Australian Air Force. Certification requires a minimum of 12 controls (calling in of airstrikes) and retaining qualification requires 6 controls in each 6-month period. For certification, 6 out of 12 controls can be done in accredited simulators. To retain qualifications, 4 out of 6 controls can be done in accredited simulators.

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Primary Mission – Combat Search and Rescue (CSAR) – Sandy

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10 pilots than for those of other Air Force aircraft.<sup>24</sup> A-10 FAC(A)s are required to attain mission proficiency while F-16 FAC(A)s and future F-35 FAC(A)s are only required to have familiarity with the mission.<sup>25</sup> Further, the A-10 community spends significantly more effort developing and retaining FAC(A) expertise. For example, A-10 FAC(A)s are required to conduct four times the yearly training sorties of F-16 FAC(A)s and almost triple those of future F-35 FAC(A)s.<sup>26</sup> Moreover, A-10 pilots currently constitute approximately half of the Air Force's FAC(A)s.<sup>27</sup>

According to Air Force officials, combat search and rescue is an unpredictable mission, unique from other rescue missions in that it is often done with little warning, deep into hostile territory, and requires searching for the survivor's location. CSAR-Sandy is an important part of the overall CSAR mission, requiring pilots specifically trained to coordinate rescue missions, escort helicopters, and suppress enemy forces. According to Air Force and combatant command officials, there is an enduring requirement for CSAR, including CSAR-Sandy. The A-10 is

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<sup>24</sup>The Air Force has guidance unique to each aircraft type that outlines yearly training requirements for pilots - called the Ready Aircrew Program Tasking Memorandum. For aircraft that have FAC(A) as a mission, this guidance states that FAC(A) qualified pilots must, at minimum, meet the requirements of the FAC(A) Memorandum of Agreement. However, Air Force-specific training requirements for different aircraft can exceed that minimum.

<sup>25</sup>The Air Force defines mission proficiency and familiarity as follows:

**Proficient:** Aircrew have a thorough knowledge of mission area but occasionally may make an error of omission or commission. Aircrew are able to operate in a complex, fluid environment and are able to handle most contingencies and unusual circumstances. Proficient aircrew are prepared for mission tasking on the first sortie in theater.

**Familiar:** Aircrew have a basic knowledge of mission area and may make errors of omission or commission. Aircrew are able to operate in a permissive environment and are able to handle some basic contingencies and unusual circumstances. Familiar aircrew may need additional training prior to first mission tasking.

<sup>26</sup>Specific yearly sortie requirements can vary by level of expertise and component (Active Component, Air National Guard, and Air Force Reserve Component). An active component inexperienced FAC(A) A-10 pilot is required to complete 16 FAC(A) sorties per year whereas a similar F-16 and F-35 pilot is required to complete 4 and 6 sorties, respectively.

<sup>27</sup>All A-10 fighter squadrons and some F-16 fighter squadrons are required to have a minimum number of FAC(A) pilots on a squadron-by-squadron basis. The Air Force has not yet determined how many FAC(A)s its F-35 squadrons will be required to have.

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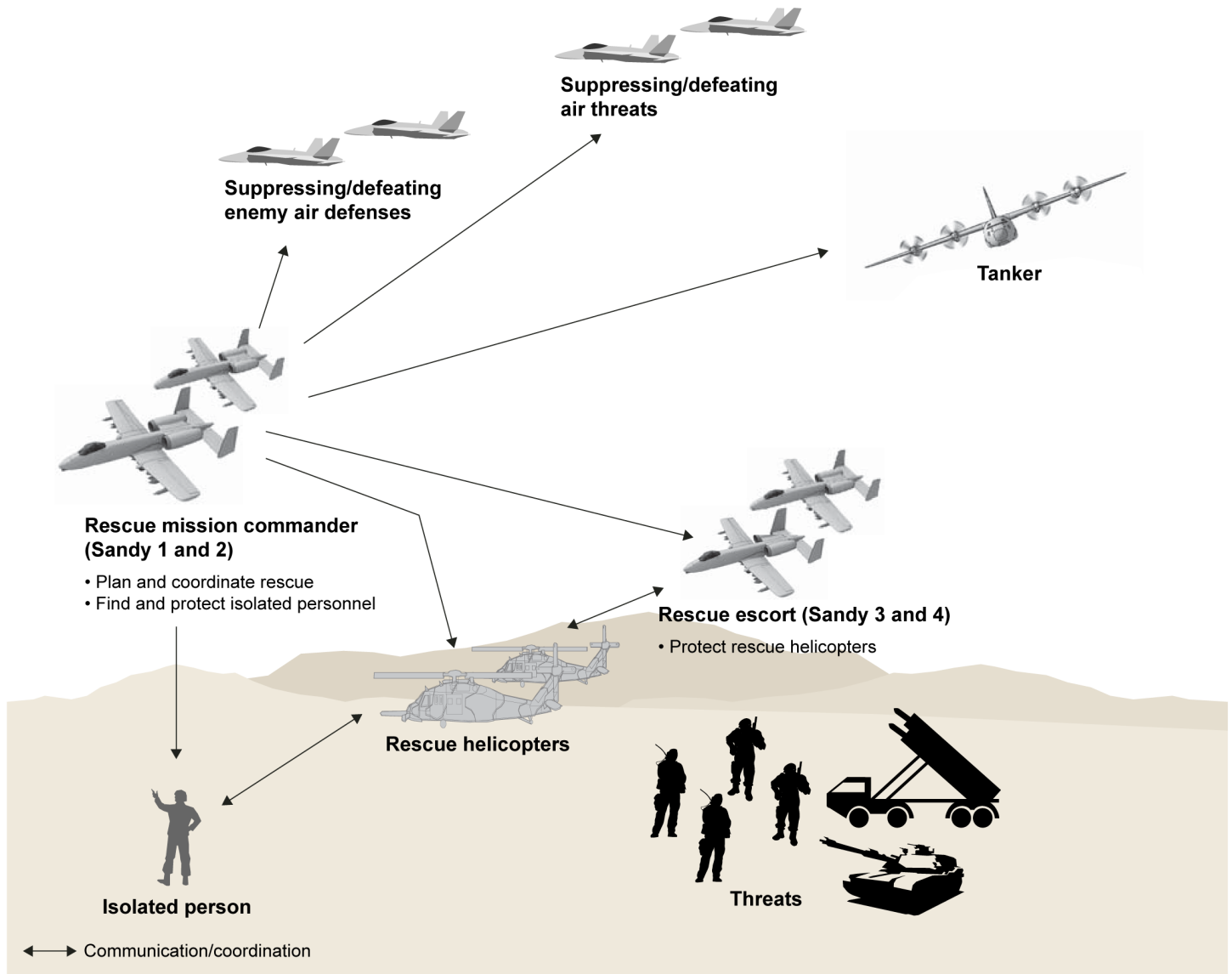
currently the only DOD platform assigned to this mission and every combat-coded squadron has CSAR-Sandy qualified pilots.<sup>28</sup> Training requirements for CSAR-Sandy qualification are very high due to the complexity of the mission. Gaining and retaining CSAR-Sandy qualification is also resource intensive because it requires many aircraft, according to Air Force and combatant command officials.

According to Air Force officials, the A-10 platform has certain capabilities that make it well suited for the CSAR-Sandy mission, including long loiter time, communications capabilities, survivability, forward-firing munitions, and ability to fly low and slow. The Air Force assessed the feasibility of using F-16s or F-15Es for the CSAR-Sandy mission and concluded aircrews could not conduct both the training necessary for this mission and the training required for their existing missions. The assessment, completed in September 2015, recommended that F-15Es or F-16s should not be tasked with the Sandy role without adequate training and also noted that the aircraft would require a number of upgrades for the CSAR-Sandy mission. The Air Force has not formally determined what aircraft, if any, will replace the A-10 for this mission, according to Air Force officials. Figure 7 illustrates the CSAR-Sandy roles and a further description can be found in appendix IV, which discusses missions conducted by the A-10.

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<sup>28</sup>The U.S. Navy has a limited number of Rescue Mission Commander qualified aircrew—one of the CSAR Sandy roles (see app. IV for details)—in each Carrier Air Wing, but training is not as in depth as A-10 training, according to officials from the Air Force and Navy. Navy training and qualifications focus mainly on supporting Carrier Strike Group operations and not combatant command requirements. The U.S. Navy Rescue Mission Commanders train mostly with U.S. Navy rescue vehicles for maritime operations whereas A-10s train with a variety of rescue vehicles from multiple services, according to the officials.

**Figure 7: Example of a Combat Search and Rescue (CSAR) Mission, Including the CSAR-Sandy Role**



Source: GAO analysis of Department of Defense information. | GAO-16-816

Secondary Missions – Counter Fast Attack Craft/Fast Inshore Attack Craft (CFF) and Air Interdiction

Counter Fast Attack/Fast Inshore Attack Craft (CFF) is a secondary mission for a number of Air Force fighters, including the A-10, but we found it is an important mission in several theaters. Potential adversaries could use groups of small boats employing swarming tactics to attack

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maritime assets. In June 2015, we reported that Air Force analysis indicated that the A-10 is the best single Air Force platform for the CFF mission.<sup>29</sup> Further, an Air Force analysis that looked at future risks concluded that divestment of the A-10 was a risk driver in one of the scenarios studied due to the loss of its CFF capability.

Air Interdiction is a very broad mission category, and a secondary mission for A-10s. However, the A-10s provide important Air Interdiction capabilities, according to combatant command officials. According to the officials, the A-10's long loiter time, large weapons load, and diverse set of weapons make it a critical asset. Further, focused low-altitude pilot training, combined with the A-10's flight characteristics, enable A-10s to effectively operate at low altitude in adverse weather conditions, which is critical in locations where the weather is often unfavorable, according to the officials.

#### Other Support – Joint Terminal Attack Controller Training

According to Air Force officials, Joint Terminal Attack Controllers provide a vital link between the Army and Air Force, directly calling in air support as well as advising and providing expertise to ground commanders on air support. Demand for Joint Terminal Attack Controllers has grown significantly since 2003 and exceeds supply. The Air Force has the largest number of Joint Terminal Attack Controllers in DOD, followed by Special Operations Command, according to the Joint Staff. The A-10 community provides significant support for Air Force Joint Terminal Attack Controller certification and qualification training; and A-10 divestment could exacerbate existing training challenges. From March 2010 to March 2016, A-10s provided 44 percent of aircraft support for Air Force Joint Terminal Attack Controller certification training, according to Air Force data. The Air Force does not centrally track qualification training, but Air Force officials said that the level of A-10 support has been similar to certification training support. The quality of Joint Terminal Attack Controller training support provided by the A-10 community is also better than the support provided by other Air Force platform communities, according to DOD officials. The A-10's wide variety of ordnance gives Joint Terminal Attack Controllers more options and allows them to deal with a larger variety of situations than they would using other aircraft. DOD officials involved with Joint Terminal Attack Controllers training told

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<sup>29</sup> [GAO-15-698R](#).



Air Force Is Taking Steps to Mitigate Potential Gaps Caused by A-10 Divestment but the Necessity and Effectiveness of These Efforts Are Unclear

us that the A-10 community generally provides better quality training opportunities because of its high level of CAS expertise and knowledge of the standards as well as deeper understanding of how ground forces operate. The A-10 community is also highly sought-after by partner nations for their own Joint Terminal Attack Controller training, which is an important component of theater cooperation efforts, according to officials from EUCOM and U.S. Pacific Command.

The Air Force recognizes that A-10 divestment could affect the missions currently performed by the A-10, and is taking a number of mitigation steps, including establishing an Air Force group focused on CAS, developing new weapons, and addressing the needs of Joint Terminal Attack Controllers. Although the Air Force will begin divesting its A-10 units in fiscal year 2018 under the current proposal, mitigation efforts are still being developed. Additionally, the Air Force has not yet determined the extent to which it will change or reprioritize training requirements for aircrew of other aircraft as a result of A-10 divestment – a decision that could significantly affect a range of missions. Examples of planned mitigation steps are described in table 3.

**Table 3: Examples of Air Force Mitigation Steps Addressing Potential Gaps Created by A-10 Divestment**

Mitigation step	Description
Establishing the Close Air Support (CAS) Integration Group <sup>a</sup>	<ul style="list-style-type: none"> <li>• Purpose is to preserve and advance CAS culture and expertise within the Air Force.</li> <li>• Intended to serve as the focal point in the Air Force for CAS issues and includes participation from the other services and Special Operations Command.</li> <li>• Begun in 2015 with Initial Operational Capability expected October 2016.</li> <li>• Key tasks include centralizing much of the initial forward air controller (airborne) (FAC(A)) training and all of the initial Joint Terminal Attack Controller (JTAC) training for the Air Force.               <ul style="list-style-type: none"> <li>• FAC(A)s will serve as the CAS experts in their squadrons and will compensate for the drop in CAS proficiency in the Air Force fighter fleet that will result from having only multi-role fighters.</li> <li>• The group will have its own aircraft (initially F-16s) to support its efforts, including providing support for JTAC certification training.</li> </ul> </li> </ul>

Mitigation step	Description
Developing new weapons	<ul style="list-style-type: none"> <li>• The Air Force is developing new weapons that may be able to mitigate some losses in CAS capability, including weapons to address fast-moving targets.               <ul style="list-style-type: none"> <li>• The Air Force CAS Experimentation Campaign intends to characterize the ability to conduct CAS across operational environments and timeframes and identify and examine new concepts and capabilities.</li> </ul> </li> <li>• Future F-35 versions are expected to improve on CAS capability from the “basic CAS” expected at initial operational capability (limited number/types of weapons and system limitations).               <ul style="list-style-type: none"> <li>• Upgraded version planned for 2019 addresses some but not all of the “basic CAS” limitations.</li> <li>• Future upgrades could include CAS improvements but these will have to compete with other F-35 priorities.</li> <li>• DOD plans operational CAS test for F-35 in 2018 that includes a comparison to the A-10. Final results are expected by early 2020.</li> </ul> </li> <li>• The Air Force is studying capability and capacity requirements for a future weapon system to provide CAS and intelligence in a permissive environment. The Air Force is also contributing to a DOD study examining whether light attack aircraft could effectively fill CAS requirements in permissive environments.<sup>b</sup></li> </ul>
Adapting training and increasing profile of Joint Terminal Attack Controllers (JTAC)	<ul style="list-style-type: none"> <li>• Revisions in 2015 to the JTAC memorandum of agreement reduces need for aircraft support by allowing more CAS controls using accredited simulators.</li> <li>• Some DOD organizations have been using contract aircraft to support JTAC training, but liability concerns have largely halted this practice, according to Joint Staff officials.</li> <li>• Initial qualification training for Air Force JTACs will be brought under the CAS Integration Group (as noted above).</li> <li>• Move expected to overcome a current training bottleneck and allow the Air Force to double its output of certified JTACs.</li> <li>• The Air Force has raised the career profile of JTACs by designating it a weapon system, which will help improve how well JTAC resource needs are considered within the Air Force.</li> </ul>

Source: GAO analysis of DOD documents and other information provided by DOD officials. | GAO-16-816

<sup>a</sup>The Air Force convened CAS experts in 2015 in order to: (1) assess the current CAS state of affairs, (2) identify gaps between future scenarios requirements and capabilities, and (3) determine the best way forward to maintain the “CAS culture” in the transition from the A-10 and legacy weapons to the modernized force. The experts made a number of recommendations, including establishing the CAS Integration Group—an Air Force organization with joint participation focused on the CAS mission—to preserve and advance CAS culture in the Air Force. According to Air Force officials, the CAS Integration Group remains relevant regardless of the fate of the A-10.

<sup>b</sup>In 2010, we reported that the Air Force was contemplating procuring a light attack aircraft to supplement the A-10 and to provide intelligence, surveillance, and reconnaissance, but no official program was established at that time. See GAO, *Tactical Aircraft: DOD’s Ability to Meet Future Requirements Is Uncertain, with Key Analysis Needed to Inform Upcoming Investment Decisions*, [GAO-10-789](#) (Washington, D.C.: July 29, 2010).

Another step the Air Force could take to mitigate the loss in expertise associated with A-10 divestment would be to change or reprioritize training requirements for aircrew of other aircraft. However, the Air Force has no concrete plans to do so and the delay in A-10 divestment has removed some of the urgency to develop such plans, according to Air Force officials. Changing training requirements comes with a cost,

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however. Air Force officials cautioned that aircrews have limited time in which to conduct their training, and in recent years, aircrews have struggled to complete their expected training. Units have had low completion rates for their secondary missions and, in many cases, have had low completion rates for their primary mission training requirements. If pilots who fly multi-role aircraft were required to increase their training in CAS, FAC(A), CSAR, CFF, and/or Air Interdiction, they would have less time available to train for other missions, and completion rates for training on these other missions would likely fall even lower than they are today. Since the A-10 trains more on CAS than any other platform and has a higher training requirement to gain proficiency, transferring those responsibilities to another platform or platforms would represent a substantial addition to existing training requirements for those platforms. Moreover, CAS is a lower priority mission for the Air Force compared to others, making it less likely that the Air Force would increase CAS training for multi-role fighters.

The Air Force's ability to determine the effectiveness and necessity of its mitigation strategies is currently limited, because it does not have clear requirements for CAS and the other missions performed by the A-10, though it has recently begun examining them. One of the difficulties in establishing a CAS requirement is that it is a fluid mission that can vary considerably according to circumstances. Unlike some missions where there are defined targets in known locations, CAS depends on the actions and interactions of enemy and friendly ground forces, making it more difficult to analyze, according to Air Force and combatant command officials. The Army—the Air Force's prime CAS customer—also has not defined its CAS needs, according to Air Force officials. However, Army officials stated that the CAS requirements developed by the Army in collaboration with the Air Force in the 1980s continue to apply even as the Army is working with the Air Force on several efforts to further define future CAS requirements.<sup>30</sup> Further, the Air Force has not defined its FAC(A) requirements or CSAR requirements. The Air Force, in consultation with the combatant commands, manages current requirements by assigning missions, such as CAS, FAC(A) and CSAR,

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<sup>30</sup>In 1985, the Army and Air Force signed a memorandum of agreement regarding a follow-on CAS aircraft. In 1987, the Army presented to the Office of the Secretary of Defense its tactical air support requirements. Both efforts are further described in appendix II. According to Army officials, these requirements continue to apply.

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and mission priorities to its current force, according to Air Force officials. However, the Air Force has not clearly defined its future needs in these mission areas. As discussed earlier, in March 2016, the Air Force initiated a comprehensive force structure study that will include examining its requirements for CAS and the other missions performed by the A-10, according to Air Force officials.

Clear requirements are an example of the type of quality information the Air Force would need to fully identify the capacity or capability gaps and risks that could result from A-10 divestment and determine appropriate mitigation strategies. Though Air Force officials stated that A-10 divestment was the best option available under its budget circumstances,<sup>31</sup> the absence of clear requirements hinders the ability of the Air Force to analyze its gaps and prioritize its decisions. The Air Force has identified potential challenges associated with A-10 divestment. For example, the Air Force has identified a need for preserving CAS culture and developing a light attack CAS aircraft. The CAS experts convened by the Air Force in 2015 stated there will be a CAS capability and capacity gap following the divestment of the A-10. However, the Air Force has been hampered in its ability to determine the significance of any reductions in CAS capabilities that result from A-10 divestment, because it does not have a requirement to assess against. This, in turn, limits the Air Force's ability to weigh risks and choose appropriate mitigation strategies. For example, an examination of CAS requirements could shed light on the relative importance of the capability to destroy moving and armored targets, something the A-10 does well. Should DOD determine that it is not an important capability, the Air Force could focus its limited resources on developing higher priority capabilities. The Air Force also has not made decisions regarding the extent to which limited training resources from other fighter aircraft need to be shifted to missions currently performed by the A-10. Such decisions are difficult to weigh without understanding the reductions in capabilities and potential gaps and risks created in these mission areas by A-10 divestment. The lack of clarity on the risks posed by A-10 divestment is evidenced by the fact that the decision was made without fully understanding the near-term impact on combatant command missions and before key decisions, including the

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<sup>31</sup>Further details on the process and priorities that resulted in the Air Force A-10 divestment proposal can be found in appendix I.

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feasibility of CSAR-Sandy replacements, were studied. Without clearly understanding the capability gaps and risks that could result from A-10 divestment before again proposing to divest the A-10, it is unclear how effective or necessary the Air Force's mitigation strategies will be.

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## DOD May Be Faced with Similar Divestment Decisions in the Future

DOD may be faced with similar divestment decisions as it seeks to best balance current capacity and capability demands with future needs. The A-10 divestment proposal is a case study of this kind of difficult decision. The Navy faced a similar situation in 2012. In June 2014 we found that the Navy, although it has a policy to guide divestment decisions, had not followed its policy when it decided in 2012 to decommission seven cruisers and two dock-landing ships well prior to the end of their service lives.<sup>32</sup> The Navy's policy requires a decision memorandum in such circumstances to address why it is in the best interest of the Navy to decommission the ships and mitigation strategies for any resulting capability gaps. Navy officials told us that they did not prepare the decision memorandum because they were under time pressure to identify budget savings. As with the A-10, Congress did not support the Navy's decision. We also found in June 2014 that the Navy policy does not require the Navy to evaluate risks associated with shortfalls in the number of ships—i.e., capacity—in making decommissioning decisions. In this case, the Navy recommended decommissioning large surface combatants and amphibious ships when it was simultaneously reporting shortfalls in those same ship types to support its shipbuilding plans.

Overall, DOD does not have guidance to help ensure that the services are collecting quality information needed to inform decisions for divesting major weapon systems before the end of their service lives. As the Air Force and Navy examples indicate, the services have made divestment proposals to emphasize modernization efforts without fully understanding and documenting the potential operational effects of those proposals. Without quality information that fully identifies capability and capacity

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<sup>32</sup>In GAO, *Surface Ships: Navy Needs to Revise Its Decommissioning Policy to Improve Future Decision Making*, [GAO-14-412](#) (Washington, D.C.: June 11, 2014), we recommended the Navy follow its policy in making future decommissioning proposals and we recommended the Navy update its policy to specifically require information about capacity as well as capability gaps. The Navy had not added a capacity requirement to its policy as of April 2016.

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gaps and associated risks resulting from divestment, the services and DOD will lack information they need to develop effective mitigation strategies, and DOD may not be well-positioned to balance current demands and future needs.

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## Air Force Estimates of A-10 Divestment Cost Savings Did Not Meet All Best Practices

Overall, the Air Force did not meet all best practices in estimating cost savings from A-10 divestment, which affected its ability to determine comparable alternatives. In its fiscal year 2015 divestment proposal, we found the Air Force's cost estimates partially met best practices for being comprehensive, minimally met best practices for being well-documented and accurate, and did not meet best practices for being credible. Because the Air Force's cost estimate did not meet best practices in these areas, the 2015 proposal potentially overstated or understated the actual savings from A-10 divestment. Additionally, Air Force officials stated they used similar practices to estimate cost savings when developing budget requests for fiscal years 2016 and 2017, thereby continuing to potentially overstate or understate the actual savings from A-10 divestment.

As we reported in June 2015, the Air Force did not fully assess the cost savings and implications associated with the A-10 divestment or its alternatives.<sup>33</sup> In its fiscal year 2015 budget request, the Air Force estimated that divesting the A-10 would allow it to save \$4.2 billion over its 5-year budget plan. However, we found the Air Force did not include certain costs related to the A-10 divestment. For example, A-10 divestment could increase the operational tempo of remaining CAS-capable aircraft, which could increase costs related to extending the service lives of those remaining aircraft. To the extent that this occurs, it would reduce the actual savings from the A-10 divestiture below the estimated \$4.2 billion. Alternatively, we found that savings could be greater than \$4.2 billion, because the Air Force estimate did not include potentially significant costs for things such as software upgrades or structural enhancements that it could incur if it were to keep the A-10. In addition, we found in June 2015 that, in presenting its budget to Congress, the Air Force provided a number of alternatives to A-10 divestment that it said would also result in approximately \$4.2 billion in cost savings. However, these alternatives were rough estimates that were

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<sup>33</sup>[GAO-15-698R](#).

illustrative only and not fully considered as alternatives to A-10 divestment, according to Air Force officials.

When we compared the Air Force’s estimate to best practices, we found it did not meet all best practices when estimating savings from the A-10 divestment for its fiscal year 2015 budget. The *GAO Cost Estimating and Assessment Guide* lists 20 best practices for a reliable cost estimate. We collapsed these best practices into four general characteristics for sound cost estimating, specifically that a sound cost estimate be (1) comprehensive, (2) well-documented, (3) accurate, and (4) credible. While the cost guide is typically used across the federal government to support decisions for investments in capital programs, the best practices in this guide also apply to cost estimates for other purposes, including decisions to fund one program over another. Since the Air Force used estimated cost savings as part of its justification for retiring the A-10 among other divestment alternatives, we believe these best practices are applicable for assessing the reliability of the Air Force’s A-10 cost savings estimate. Table 4 provides a summary of our assessment of the Air Force’s A-10 cost estimate against these four characteristics.

**Table 4: GAO Assessment of A-10 Cost Estimate Compared to Best Practices**

Characteristic	Description of best practices	Rating <sup>a</sup>	Summary of GAO’s assessment
Comprehensive	Comprehensive cost estimates should include all costs from inception through retirement of the program and be guided by a baseline document with common definitions of the program from which all life-cycle cost estimates will be derived. The estimate should have a standardized structure that breaks costs into discrete elements with sufficient detail to ensure that cost elements are neither omitted nor double-counted. There should also be documentation listing all cost-influencing ground rules and assumptions used to develop the estimate.	Partially met	The estimate included some costs, such as weapons system sustainment, flying hours, and military personnel. However, it excluded other costs, such as decommissioning costs, service-life extensions of remaining CAS-capable fighters, and potential structural enhancements to the A-10. The estimate was based on Air Force and DOD budget guidance that required general reductions in spending. However, it did not specify technical objectives for the A-10 program to achieve. It also did not indicate whether inflation was taken into account for the A-10 estimate or any other cost-influencing ground rules and assumptions. A standardized structure for the A-10 cost estimate was provided but only for operating and support costs, and it did not include end-of-life-cycle costs or an explanation of how the cost elements inform the estimate.

Characteristic	Description of best practices	Rating <sup>a</sup>	Summary of GAO's assessment
Well-documented	Well-documented cost estimates are supported by detailed documentation that describes how they were derived and how they expect funding will be spent to achieve a given objective. Documentation should include discussions of how cost estimates were normalized and evidence that the cost estimates were reviewed and accepted by management.	Minimally met	The documentation pointed to source data but did not fully explain how they were used or how the estimate was developed. Air Force and DOD guidance were general and focused on the need to reduce spending and have assets that were survivable. Calculations were not described, and while the estimate was validated by management, it did not include all life-cycle costs.
Accurate	Cost estimate results are unbiased, not overly conservative or optimistic, and based on an assessment of most likely costs. Estimates are adjusted properly for inflation and contain few, if any, minor mistakes. Cost estimates should be based on historical costs, and the estimating technique for each cost element should be used appropriately.	Minimally met	The Air Force cited databases of historical cost data to support the estimate, but the estimate lacked a range or a confidence level for the point estimate. The estimate did not indicate if inflation was included and no estimating techniques were discussed. Also, the cost model could not be reviewed because it either did not exist or no one could find it.
Credible	Cost estimates should include a sensitivity analysis and a risk and uncertainty analysis. Cost elements should be cross-checked, and an independent cost estimate should be conducted by an outside group to determine whether other estimating methods produce similar results.	Not met	A sensitivity analysis was not part of the estimate. In addition, there was no documentation of a risk and uncertainty analysis, and there was no documentation showing that cost elements were cross-checked. Also, an independent cost estimate was not performed.

Source: GAO analysis of Air Force information. | GAO-16-816

<sup>a</sup>Not met – Air Force provided no evidence that satisfies any of the criterion. Minimally met–Air Force provided evidence that satisfies a small portion of the criterion. Partially met–Air Force provided evidence that satisfies about half of the criterion. Substantially met–Air Force provided evidence that satisfies a large portion of the criteria. Met–Air Force provided complete evidence that satisfies the entire criterion.

The Air Force used cost estimation practices similar to those used for the fiscal year 2015 budget process to estimate A-10 cost savings for the fiscal years 2016 and 2017 budgets, according to Air Force officials. In its fiscal year 2016 budget request, the Air Force estimated that A-10 divestment would amount to \$ 4.7 billion in savings over its 5-year budget plan. In its fiscal year 2017 budget request, the Air Force estimated that retaining the A-10 under its revised divestment plan would cost \$3.4 billion over 5 years. By applying similar cost estimation practices from its fiscal year 2015 budget process, the Air Force's fiscal year 2016 and 2017 A-10 divestment cost estimates may continue to overstate or understate the actual figure and may not be reliable, as we found the 2015 estimate to be.

As we reported in June 2015, the A-10 divestment proposal emerged from the Air Force's budget development process for fiscal year 2015,



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which was driven by DOD and Air Force guidance to reduce top-line funding. Following DOD strategic and budget guidance, the Air Force sought to prioritize, among other things, fifth-generation aircraft like the F-35, readiness, and multi-role aircraft, while placing a lower priority on single-role aircraft like the A-10. According to Air Force officials, significant research, operational analysis, and strategic planning are combined during the budget development process to give senior leadership the correct information to make major force structure decisions, such as divesting aircraft (see app. I for details of the budget development process that led to the fiscal year 2015 A-10 divestment proposal).

Although the A-10 divestment cost savings estimate follows some cost estimating best practices, it largely was developed using budget guidance. Air Force and DOD budget guidance documents do not require cost estimates for divestments, and therefore the A-10 cost savings estimate did not follow best practices and include certain elements, such as all life-cycle costs or sensitivity analysis that identifies a range of possible costs based on varying assumptions. According to Air Force cost estimation guidance, it is understandable that decision makers need point estimates and not a range of possible costs when preparing and managing a budget.<sup>34</sup> However, by making a major divestment decision within the constraints of its budget development process, the Air Force and DOD based the proposal to retire the A-10 on a point estimate, without insight into the probability of achieving those savings. Overall, since the A-10 divestment estimate did not meet all best practices, the Air Force cannot ensure that it has a reliable estimate of the cost savings it could generate by divesting the A-10. Without developing a reliable cost estimate based on best practices, the Air Force is at risk of continuing to make decisions regarding the A-10 without full knowledge of the cost implications. As we reported in June 2015, the Air Force presented a number of alternative options that would result in similar savings as A-10 divestment, with the highest risk option being deferring some F-35 procurement. By developing a high-quality, reliable cost estimate of savings from A-10 divestment, the Air Force would have a sound basis from which to develop and compare alternatives and their associated risks that achieve similar savings or make adjustments to other fighter-

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<sup>34</sup>U.S. Air Force, *Cost Risk and Uncertainty Analysis Handbook* (April 2007).

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attack programs or mission areas like air superiority or global strike. In addition, we did not find DOD-wide budget guidance requiring cost estimates for divestment decisions on other major weapon systems. Without this guidance, DOD may not be able to develop a high-quality, reliable cost estimate of savings when divesting other major weapon systems in the future and experience difficulty identifying alternatives for achieving similar cost savings.

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## Conclusions

As late as fiscal year 2014, the Air Force had planned to keep its A-10 fleet through at least 2035, but faced with an increasingly constrained fiscal environment, it determined that divesting the aircraft was a necessary step to balance its current and future needs. However, it made this decision as part of its fiscal year 2015 budget deliberations without fully examining the implications of this course of action. The upcoming DOD evaluation of F-35 CAS capabilities and the Air Force efforts under way to evaluate its force structure requirements are positive steps forward that should provide a better basis from which the Air Force can evaluate the implications of A-10 divestment and determine the appropriate path forward, which may or may not include early divestment. However, the fiscal year 2017 budget request marks the third consecutive year that the Air Force proposed divesting the A-10 without having determined its requirements for the A-10's missions and the gaps and risks resulting from divestment. As a result, it is unclear how effective or necessary its mitigation strategies will be. A recent example illustrates this lack of clarity. In its fiscal year 2017 budget proposal the Air Force deferred some F-35 procurement—an option the Air Force originally identified as the highest risk alternative to A-10 divestment. Should it continue to pursue the early divestment of the A-10 fleet as a way to balance current demands and future needs, the Air Force would benefit from quality information that fully identifies capacity and capability gaps and associated risks resulting from divestment and it could use that information to develop mitigation strategies. Additionally, a high-quality, reliable cost estimate would provide the Air Force with a sound basis from which to develop and consider alternatives to achieve its budget targets.

More broadly, the lack of quality information to support A-10 divestment reveals a weakness in how DOD may make future decisions to divest major weapon systems, because the department lacks guidance on how to approach such decisions. Department officials could find themselves in the position where they must again consider divesting legacy platforms as a means to achieve savings that can then be applied to their modernization plans. Should that happen, the department will need

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guidance to ensure that DOD is collecting the quality information it needs to fully consider the consequences of such divestments—consequences that can be both operational and financial. Such guidance could help to ensure that DOD’s examination of divestment options includes the quality information needed to fully identify gaps and associated risks resulting from divestment that can then be used to develop effective mitigation strategies. Further, it could help to ensure that DOD uses high-quality, reliable cost estimates that better position the department to identify alternatives for achieving similar cost savings in the future. Without this guidance, DOD may continue to face congressional challenges to future divestment proposals and take unnecessary risks as it continues to balance current demands and future needs.

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## Recommendations for Executive Action

To make a well-informed decision about the future of its A-10 aircraft, we recommend that before again recommending divestment of the A-10, the Secretary of the Air Force:

- Develop quality information that fully identifies gaps in capacity or capability that would result from A-10 divestment, including the timing and duration of any identified gaps, and the risks associated with those gaps; and
- Use that information to develop strategies to mitigate any identified gaps.

In addition, to further inform decisions about the future of the A-10, we recommend the Secretary of the Air Force, in considering divestment, develop a high-quality, reliable cost estimate utilizing best practices.

As DOD faces future decisions on how to balance its existing capabilities and capacities against future modernization requirements, it will need quality information to help inform such decisions. To ensure that senior leaders have the quality information on which to base future force structure decisions, we recommend the Secretary of Defense develop and promulgate department-wide guidance that establishes specific informational requirements to be met before proposing divestment of major weapon systems that have not reached the end of their expected service lives. This guidance should require identifying gaps in capacity or capability that will occur for the proposing service and any other service if the divestment proposal is approved; recommending strategies for mitigating any identified gaps; and developing a high-quality, reliable cost estimate of the major weapon system proposed for divestment that can be used to identify alternatives for achieving similar savings.

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## Agency Comments and Our Evaluation

In written comments on a draft of the July 2016 classified report, the Secretary of the Air Force, on behalf of DOD, non-concurred with all three of our recommendations. The department subsequently provided an unclassified version of those comments, which are included in this report, in appendix V. The complete classified response and our evaluation of those comments are in the classified report (GAO-16-525C). DOD also provided technical comments, which we have incorporated as appropriate.

The Air Force, on behalf of DOD, non-concurred with our recommendation that the Secretary of the Air Force should, before again recommending A-10 divestment, develop quality information that fully identifies gaps in capacity or capability that would result from A-10 divestment, and use that information to develop strategies to mitigate any identified gaps. In its comments, the Air Force stated that it took exception to GAO's assertion that the Air Force made the decision to divest the A-10 without knowledge or understanding of the associated risk and capability gaps. Both in this report and our classified preliminary observations report (GAO-15-600RC), we detail the process that led to the divestment proposal and explain how fiscal constraints and strategic priorities, including prioritizing fifth generation fighters like the F-35, drove the Air Force decision. We also recognize that the Air Force conducted some analysis on the effects of A-10 divestment and is taking some mitigation steps. However, since divestments, like investments, can have far-reaching cost and operational consequences, such decisions should be based on quality information that would include, among other things, clearly identifying the gaps created by the action and strategies for mitigating those gaps.

In our report, we identify numerous areas where significant gaps in knowledge persist years after the Air Force decided to pursue A-10 divestment. For example, we found that the full extent to which the divestment proposals create capacity gaps and increase risk is difficult to determine, because DOD does not have a clearly established Air Force fighter aircraft capacity requirement. Further, we found that the Air Force has not comprehensively assessed potential mission capability gaps caused by A-10 divestment or the effects of divestment on its ability to support Joint Terminal Attack Controller training. As we describe in our report, though the Air Force and DOD are taking steps to mitigate potential gaps, they have not established clear requirements for the missions that the A-10 performs, including CAS, FAC(A), and CSAR-Sandy, and in the absence of these requirements, have not fully identified the capability gaps and risks that could result from A-10 divestment and

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the effectiveness or necessity of the Air Force's and the department's mitigation strategies. We recognize that the upcoming DOD evaluation of F-35 CAS capabilities and the Air Force efforts under way to evaluate its force structure requirements are positive steps forward that should provide a better basis from which the Air Force can evaluate the implications of A-10 divestment and determine the appropriate path forward. However, the Air Force does not yet have the quality information it needs to make a well-informed decision about the future of its A-10 aircraft.

In its response, the Air Force also stated that we failed to highlight Air Force analysis that indicated the A-10 divestment was the most acceptable strategy, specifically citing two classified documents as evidence that it had the necessary information to support its divestment decision. The Air Force's classified response included a third document. However, these three documents have significant limitations. Both the Air Force summary of these documents and our analysis of their limitations are classified and therefore they are not included in this report. They can be found in GAO-16-525C.

The Air Force's response that it had the necessary information to make an informed divestment decision is not consistent with the actions it made subsequent to the analyses it cited. For example, a year after proposing to divest the A-10, the Air Force convened a group of CAS experts to, among other things, examine the state of CAS affairs and examine gaps. We also reported that in March 2016 the Air Force initiated a comprehensive force structure study that will include examining its requirements for CAS and other missions performed by the A-10. It is also studying the requirements for a future weapon system to provide CAS in a permissive environment. Our report also notes that a September 2015 Air Force study identified challenges to replacing the A-10 in the CSAR-Sandy role and that the service has not yet settled on a replacement. While the analysis identified by the Air Force in its comments may have been sufficient at the time to help inform much of the fiscal year 2015 budget deliberations, we believe that, because of their far-reaching cost and operational consequences, divestment decisions, like investment decisions, should be based on a higher standard of information. The findings of our report show that significant information gaps remain despite the initial and subsequent Air Force analyses and therefore we believe our recommendation remains valid.

In addition, the Air Force did not concur with our recommendation to develop a high-quality, reliable cost estimate utilizing best practices to

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further inform decisions about the future of the A-10 but without much explanation.<sup>35</sup> In its response, the Air Force disagreed with our characterization that such criteria were not used in the A-10 divestment considerations and stated that high-quality internal data were used to develop accurate cost estimates based on existing best practices. In our report, we recognized that the Air Force used programming and sustainment data to inform their cost estimate, such as weapons system sustainment, flying hours, and military personnel. In addition, we do not state that the Air Force did not use criteria in its A-10 divestment consideration but rather describe, in detail, the aspects of the A-10 cost estimate that did and did not meet best practices. Specifically, we describe the estimate as partially meeting best practices for being comprehensive, minimally meeting best practices for being well-documented and accurate, and not meeting best practices for being credible. Further, and as summarized in the scope and methodology section of this report, we sent our analysis to the Air Force for feedback prior to publication and they agreed with our assessment. A high-quality, reliable cost estimate would provide the Air Force with a sound basis from which to consider alternatives to achieve its budget targets. We therefore continue to recommend that the Air Force enhance the quality and reliability of its A-10 cost estimate by utilizing these best practices.

Finally, the Air Force, on behalf of DOD, did not concur with our recommendation to provide senior leaders with quality information by developing and promulgating department-wide guidance that establishes specific informational requirements to be met before proposing divestment of major weapon systems that have not reached the end of their expected service lives. The response stated that the department already has guidelines and robust procedures in place to provide senior leaders with quality information with which to make divestment decisions, including through budgeting and acquisition processes. As we reported, the A-10 divestment proposal came out of the fiscal year 2015 budget development process. We cited key information gaps that remain despite the department proposing to divest the A-10 in three consecutive budget proposals. The response also stated that in cases where it is considering developing a new weapon system to replace existing capabilities, it

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<sup>35</sup> The Air Force's unclassified response to the second recommendation states that additional details regarding its non-concurrence were included in its classified response. However, the responses are virtually identical.

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conducts a thorough Analysis of Alternatives that examines the factors identified in the GAO recommendation in order to provide senior leaders with quality information. As our report shows, this was not the case for the A-10 divestment and has not been the case for other divestment proposals in the past. Proposals like the A-10 divestment and the Navy's 2012 proposal to decommission seven cruisers and two dock-landing ships well prior to the end of their service lives were made in the context of the budget process, not as part of a proposal to develop new systems. As such, the Analysis of Alternatives described by DOD in its response is not applicable. Therefore, in order to ensure senior leaders have the quality information DOD agrees they need, we continue to believe that DOD needs to develop and promulgate guidance to help ensure that the department and services are collecting the quality information necessary to inform decisions for divesting major weapon systems before the end of their service lives. Without this guidance, DOD may continue to divest weapon systems and overlook the kinds of capability, capacity, and cost issues we point out in this report, which ultimately hinders DOD's ability to best balance current demands and future needs.

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We are sending copies of this report to appropriate congressional committees; the Secretary of Defense; the Chairman of the Joint Chiefs of Staff; and the Secretaries of the Air Force, Army, and Navy. In addition, the report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-3489 or [pendletonj@gao.gov](mailto:pendletonj@gao.gov). Contact points 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 VI.



John H. Pendleton  
Director, Defense Capabilities and Management

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*List of Committees*

The Honorable John McCain  
Chairman  
The Honorable Jack Reed  
Ranking Member  
Committee on Armed Services  
United States Senate

The Honorable Thad Cochran  
Chairman  
The Honorable Richard Durbin  
Ranking Member  
Subcommittee on Defense  
Committee on Appropriations  
United States Senate

The Honorable Mac Thornberry  
Chairman  
The Honorable Adam Smith  
Ranking Member  
Committee on Armed Services  
House of Representatives

The Honorable Rodney Frelinghuysen  
Chairman  
The Honorable Pete Visclosky  
Ranking Member  
Subcommittee on Defense  
Committee on Appropriations  
House of Representatives



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# Appendix I: Fiscal Constraints and Strategic Priorities Drove the A-10 Divestment Proposal

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The Air Force proposal to divest the A-10 was the result of fiscal constraints and a strategy-based, portfolio-wide review of alternatives. Air Force budget guidance for fiscal year 2015 stated that it needed to reduce its previously planned spending by 11.5 percent over the 5-year budget. In developing its fiscal year 2015 budget request at lower-than-anticipated levels, the Air Force examined its entire portfolio and concluded, among other things, that the benefits of divesting the A-10 outweighed the cost of retaining it. Department of Defense (DOD) and Air Force strategic priorities guiding the Air Force proposal included fifth generation aircraft, such as the F-35; high-end intelligence, surveillance, and reconnaissance capabilities; and multi-role aircraft over single-role aircraft. With a smaller total force, multi-role fighters provide commanders with greater operational flexibility. For example, F-16s and F-15Es not only perform close air support (CAS) missions but can also conduct air-to-air missions, which the A-10 generally cannot. DOD reviewed and approved the Air Force A-10 divestment decision and submitted it as part of its fiscal year 2015 budget request. Figure 8 describes the fiscal year 2015 Air Force budget development process.

Figure 8: Air Force Fiscal Year 2015 Budget Development Process



Source: GAO analysis of Department of Defense (DOD) documents and other information provided by DOD officials.. | GAO-16-816

According to Air Force officials, the Air Force did not re-examine this decision or conduct additional analysis for the fiscal year 2016 budget request, which also proposed divesting the A-10 by the end of fiscal year 2019. Citing rising demands caused by operations against the Islamic State of Iraq and the Levant (ISIL) and growing concerns about Russia, the Air Force fiscal year 2017 budget request temporarily reversed its decision to divest the A-10 fleet by fiscal year 2019.

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# Appendix II: Close Air Support (CAS) Responsibilities and Capabilities Among the Services

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## Department of Defense (DOD) Evaluations of CAS Responsibilities and Feasibility of Transferring the A-10 to Another Service

DOD has not recently evaluated the distribution of CAS responsibilities and capabilities among the services, but officials believe DOD would likely incur significant costs and operational challenges if it were to transfer the A-10 from the Air Force to the Army or Marine Corps. For example, Air Force officials said the Air Force owns and distributes its targeting and jamming pods across several fleets, including the A-10; therefore, the Army or Marine Corps would need to purchase targeting and jamming pods for the A-10 fleet if the Air Force transferred its A-10s to them. In addition, existing Army and Marine Corps facilities and runways may need to be enhanced to support the A-10s. Army and Marine Corps officials also cited several cost-related issues. According to Army officials, Army Aviation already consumes a large portion of the Army's budget and the A-10 fleet transfer would not likely be accompanied by increased funding. This would force the Army to sacrifice resources from other aviation priorities. Similarly, the Marine Corps does not want to operate and maintain an aging fleet of A-10s, because it would divert resources away from current modernization efforts. The Marine Corps also prefers aircraft with "from the sea" capabilities and the A-10 does not operate from Navy ships.

Service officials stated that the services have different perspectives on the tactical application of CAS that could affect training if the A-10 fleet was transferred from the Air Force. Air Force officials see the A-10 as a theater-wide air asset and believe that the Army would tie A-10s to the division or brigade level, thereby generating situations where an Army ground commander could be reluctant to use the A-10 outside of his battle area. Air Force officials also noted that transferring the A-10 to another service would create an overlap of responsibilities with Air Force CAS-capable platforms, such as F-16, and require years to redefine joint fires doctrine and training on new tactics, techniques, and procedures. Marine Corps officials stated that the primary purpose for Marine Aviation—the Air Combat Element specifically—is to provide support for the Ground Combat Element as part of an integrated campaign. Typically, Marine Aviation is not made available for joint tasking, unless there is excess capacity.

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## History of the Distribution of Close Air Support Responsibilities and Capabilities

The distribution of CAS responsibilities and capabilities among the services has been discussed since World War II but has not seen significant debate since 1989. Table 5 provides a chronological summary of key CAS events set within the context of ongoing wars or operations (purple rows), and procurement actions (blue rows). It also shows how similar CAS issues have remained over the years.

**Appendix II: Close Air Support (CAS)  
Responsibilities and Capabilities Among the  
Services**

**Table 5: Summary of Key Close Air Support (CAS) Time Frames and Events**

<b>Key CAS Timeframes and Events</b>	
<b>1939-1945</b>	<b>World War II</b> Major source of doctrine and thinking for CAS where Army Air Forces explored centralized command and employment of air assets versus subordinated air force capabilities to ground force needs and local situations. <sup>a</sup>
<b>1947</b>	<b>National Security Act of 1947 and Executive Order 9877</b> Established the U.S. Air Force, defined the functions of the armed forces, and required newly created Air Force to provide air support to land and naval forces.
<b>1948</b>	<b>Key West agreement and issuance of Executive Order 9950</b> Key West agreement continued to give Air Force primary responsibility for providing CAS to the Army while the Navy and Marine Corps retained responsibility for CAS in support of joint amphibious operations and a collateral responsibility to provide CAS in support of land operations in general. Executive Order 9950 revoked Executive Order 9877.
<b>1950-1953</b>	<b>Korean War</b>
<b>1951/1952</b>	<b>Pace-Finletter memorandums of understanding of 1951 and 1952</b> The Army and Air Force secretaries signed two separate memorandums of understanding that the Army would not duplicate Air Force CAS capabilities with both fixed-wing and rotary-wing platforms.
<b>1956</b>	<b>Secretary of Defense memorandum of November 26, 1956</b> Secretary of Defense Charles Wilson reinforced the Pace-Finletter memorandums of understanding of 1951 and 1952 and more clearly restricted the Army from CAS duplication.
<b>1957</b>	<b>CONARC TT 110-100-1/TACM 55-3, Joint Air-Ground Operations</b> The Army and Air Force jointly published the first post-World War II joint agreement on CAS procedures.
<b>1962</b>	<b>Army Howze Board and Air Force Disosway Board</b> The Howze Board recommended the use of helicopters for fire support, and the Disosway Board questioned the ability of helicopters to provide CAS in a hostile environment.
<b>1963</b>	<b>Army Advanced Aerial Fire Support System (AAFSS) Program</b> Created to develop an attack helicopter. <sup>b</sup>
<b>1964-1973</b>	<b>American involvement in the Vietnam War</b>
<b>1965</b>	<b>House Armed Services Subcommittee Investigations of CAS in Vietnam</b> Rep. Otis Pike chaired a subcommittee for 7 days to investigate Vietnam CAS deficiencies.
<b>1966</b>	<b>Johnson-McConnell Agreement</b> Air Force relinquished any claim to the use of rotary-wing aircraft for fire support, and the agreement did not specifically refer to helicopter fire support as CAS.
<b>1966</b>	<b>Air Force initiates A-X program</b> Led to the development of the A-10.
<b>1967</b>	<b>First AH-1 Cobras delivered to Army</b>
<b>1971</b>	<b>First AV-8 Harrier delivered to the Marine Corps</b>
<b>1971</b>	<b>DOD study on A-X, AAFSS, and AV-8</b> Concluded that platforms should be developed for the needs of their respective services.
<b>1971</b>	<b>Start of Lightweight Fighter Program</b> Led to the development of F-16.

**Appendix II: Close Air Support (CAS)  
Responsibilities and Capabilities Among the  
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**Key CAS Timeframes and Events**

<b>1975</b>	<b>First A-10 delivered to Air Force</b>
<b>1976</b>	<p><b>Army and Air Force Letter to House Armed Services Committee on Army Attack Helicopters</b></p> <p>Chiefs of Staff of the Army and Air Force wrote that Army attack helicopters—while they provided fire support—did not duplicate Air Force CAS, which was intended to address theater-wide CAS requirements. In their letter, the two Chiefs of Staff focused on operational range and doctrine as the defining differences between the two types of platforms.</p>
<b>1978</b>	<b>First F-16 delivered to Air Force</b>
<b>1982</b>	<p><b>The Army developed concept on AirLand battle</b></p> <p>U.S. Army Training and Doctrine Command developed this concept to address the issue of Soviet follow-on assaults and issued a new version of FM 100-5 to officially incorporate the concept of AirLand battle into Army doctrine.</p>
<b>1984</b>	<p><b>Army and Air Force memorandum of agreement called the “31 Initiatives”</b></p> <p>Memorandum of agreement on joint AirLand combat operations. Reiterated the Air Force’s role in providing fixed-wing CAS to the Army and other initiatives to coordinate CAS, to include an initiative for joint development of doctrine for rear-area CAS and an initiative for both services to develop coordinated joint positions on future aircraft development.</p>
<b>1984</b>	<b>First AH-64 Apache delivered to Army</b>
<b>1985</b>	<p><b>Army and Air Force memorandum of agreement on follow-on CAS aircraft and Air Force exploration of A-10 alternatives</b></p> <p>The Army and Air Force agreed to establish coordinated joint positions on future aircraft development. Both services also agreed that a CAS follow-on aircraft to the A-10 needed to be effective across a broad spectrum of combat scenarios and threats ranging from the friendly rear area to the traditional main battle area and the deep maneuver arena. The Air Force also issued a request for information to industry to obtain design alternatives for a follow-on aircraft to the A-10 that could perform CAS and battlefield air interdiction.<sup>c</sup></p>
<b>1986/87</b>	<p><b>Air Force proposal to replace the A-10</b></p> <p>Questioning the A-10’s survivability in high-threat environments such as central Europe, the Air Force recommended to the Office of the Secretary of Defense that the A-10 be replaced by the A-16, a variant of the F-16. The Office of the Secretary did not concur, preferring that alternatives be studied further.<sup>d</sup></p>
<b>1987</b>	<p><b>Army presentation of CAS requirements to Office of the Secretary of Defense</b></p> <p>The Army presented to the Office of the Secretary of Defense its tactical air support requirements, which included high sortie rates, responsiveness, the ability to survive and penetrate enemy defenses, the ability to operate under the weather day and night, the capability to carry a wide variety of weapons in sufficient quantities to be effective, and the flexibility to provide support across the entire spectrum of the battlefield. These requirements were considered the most detailed requirements developed to date.<sup>e</sup></p>
<b>1988</b>	<p><b>National Defense Authorization Acts for fiscal year 1988 and fiscal year 1989</b></p> <p>Required DOD to provide a plan for conducting battlefield air interdiction and CAS. Among other things, Congress called for the Secretary of Defense to examine the transfer of the A-10 and the CAS mission to the Army.</p>
<b>1989</b>	<p><b>DOD review of roles and missions in compliance with 1986 Goldwater-Nichols Act</b></p> <p>Chairman of the Joint Chiefs of Staff Admiral William Crowe stated that all military services perform CAS functions with their own CAS-capable aircraft. A month later, the Chiefs of Staff of the Army and Air Force jointly dissent with this opinion, stating the two services do not view attack helicopters as CAS weapon systems.</p>
<b>1990 – 1991</b>	<b>Operations Desert Shield &amp; Desert Storm</b>
<b>2001 – 2014</b>	<b>Operations Enduring Freedom and Iraqi Freedom</b>
<b>2014 – Present</b>	<b>Operation Inherent Resolve</b>

Source: GAO analysis of DOD information | GAO-16-816

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**Appendix II: Close Air Support (CAS)  
Responsibilities and Capabilities Among the  
Services**

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Note: Sections in purple represent wars and operations in which the U.S. was involved. Sections in blue represent the development or delivery of aircraft that have been part of the CAS debate. Sections in white represent instances where DOD reviewed the distribution of CAS responsibilities and force structure.

<sup>a</sup>Army Air Forces used the North African campaign in 1943 to test the concept of how tactical air should operate by forming a combined air command with the Royal Air Force to become the Northwest African Air Forces.

<sup>b</sup>In intervening years and as the AAFSS remained in development, Army procurement and development of helicopters grew, and there was concern from the House Committee on Armed Services about potential duplication of CAS by Army aircraft.

<sup>c</sup>Air Force's Aeronautical Systems Division analyzed this solicitation and concluded that all proposed design alternatives were technically viable candidates and that it was difficult to eliminate a candidate, because CAS requirements were not clearly defined.

<sup>d</sup>Between 1984 and 1989, several major studies were conducted on CAS aircraft alternatives, but DOD did not agree on an acceptable alternative.

<sup>e</sup>Army officials we interviewed in 2015 listed similar qualities that—in their opinion—make for effective CAS, including: (1) responsiveness – the ability to support ground forces in all situations regardless of adverse conditions, such as weather; (2) timeliness – the ability of CAS platforms to respond quickly when ground forces need support; (3) good target identification – the ability to accurately identify the enemy target; (4) good identification of friendlies – the ability to identify blue (friendly) and green (neutral) force locations to prevent unintended casualties; (5) long loiter time – the ability to remain on station and reengage the enemy, if necessary; and (6) psychological impact – though hard to measure and quantify, the ability of ground forces to see CAS platforms providing CAS can have a positive psychological impact on friendly forces.

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# Appendix III: Scope and Methodology

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To assess the extent to which the Air Force and the Department of Defense (DOD) have the quality information needed to understand the implications of A-10 divestment, we assessed strategic guidance, memorandums, aircraft inventory, training syllabi, and other documentation against DOD guidance on economic analysis for decision-making, Air Force guidance on business case analysis procedures, and GAO knowledge-based criteria.<sup>1</sup> DOD guidance and GAO knowledge-based criteria identify key factors that, while developed for investment decisions, are applicable to making divestment decisions. These key factors include, among other things, having clearly defined and understood requirements that provide a baseline from which to identify gaps and their associated risks and inform decisions on how to best address the gaps. Specifically, we reviewed documents—such as the DOD Global Force Management Implementation Guidance and DOD Directive 8260.05 on the Support for Strategic Analysis—that describe how the combatant commands are to identify force requirements and request resources for current operations and how the services are to explore potential future force structure requirements. We met with officials to understand the extent to which the Air Force used these processes to specifically assess current and future force structure requirements and gaps for the range of missions conducted by the A-10 and develop corresponding mitigation options.

To assess the reliability of Air Force A-10 squadron divestment data, we reviewed Air Force briefings that describe the divestment phasing of A-10 squadrons by Air Force base and fiscal year and confirmed our interpretation of the data in these briefings with Air Force officials. To assess the reliability of Air Force close air support (CAS)-capable inventory data, we compared Air Force data with an inventory graphic from the Air Force's fiscal year 2017 budget briefing to Congress and

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<sup>1</sup>Department of Defense Instruction 7041.03, *Economic Analysis for Decision-making*. (Sept. 9, 2015), Air Force Manual 65-510, *Business Case Analysis Procedures*. (Oct. 22, 2010), and GAO, *Best Practices: Using a Knowledge-Based Approach to Improve Weapon Acquisition*, [GAO-04-386SP](#) (Washington, D.C.: January 2004). To develop these best practices, GAO drew on lessons learned from leading commercial firms that have developed increasingly sophisticated products in less time and at lower cost. A knowledge-based approach ensures that, at key points of product development, a high level of knowledge exists before making large investment decisions. GAO has used these best practices to review numerous weapon systems since 1996. For a list of GAO reports using these best practices, see GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, [GAO-16-329SP](#) (Washington, D.C.: Mar. 31, 2016).

discussed it with Air Force officials. We found both sources of data sufficiently reliable for our purposes of providing a general comparison of the three recent A-10 divestment proposals and showing a general trend in Air Force-projected inventory. We also reviewed training requirements in Air Force Ready Aircrew Program Tasking Memorandums as well as initial qualification and advanced course syllabi for the A-10, F-15E, F-16, and F-35 to compare the levels of CAS knowledge taught to the pilots of each aircraft.<sup>2</sup> We met with officials to determine whether the Air Force used these requirements to assess training expertise that could be lost by divesting the A-10 and develop mitigation options. We also reviewed classified reports describing the assumptions and scenarios used to analyze risk levels associated with several Air Force divestment options to determine whether the Air Force specifically assessed the effect that A-10 divestment would have on conducting CAS and several other A-10 missions. We did not, however, assess the reasonableness of the scenarios or assumptions, because they were derived from DOD guidance to all services and were outside the scope of this review.

To assess the Air Force's estimate of A-10 cost savings, we analyzed the Air Force's cost estimating approach against best practices in the 2009 *GAO Cost Estimating and Assessment Guide*. GAO designed the cost guide to be used by federal agencies to assist them in developing reliable cost estimates and also as an evaluation tool for existing cost estimates. To develop the cost guide, GAO cost experts assessed measures applied by cost-estimating organizations throughout the federal government and industry and considered best practices for the development of reliable cost estimates. We analyzed the cost-estimating practices used by the Air Force against these best practices. For our reporting needs, we collapsed these best practices into four general categories representing practices that help ensure that a cost estimate is reliable: specifically, that it is (1) accurate, (2) well documented, (3) comprehensive, and (4) credible. After a review of all source data, all supporting documentation, interviews with cognizant officials, and independent research, we assessed the extent to which the Air Force met these best practices on a five-point scale:

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<sup>2</sup>For the F-35, we were only able to review the Ready Aircrew Program Tasking Memorandum, because the initial qualification and advanced course syllabi were not yet finalized, according to Air Force officials.



- Not Met—Air Force provided no evidence that satisfies any of the criteria.
- Minimally Met—Air Force provided evidence that satisfies a small portion of the criteria.
- Partially Met—Air Force provided evidence that satisfies about half of the criteria.
- Substantially Met—Air Force provided evidence that satisfies a large portion of the criteria.
- Met—Air Force provided complete evidence that satisfies the entire criteria.

We determined the overall assessment rating by assigning each individual best practice a number: Not Met = 1; Minimally Met = 2; Partially Met = 3; Substantially Met = 4; and Met = 5. For the purposes of this assessment we also included a Not Applicable (N/A) assessment category. Then, we took the average of the individual best practice assessment ratings to determine the overall rating for each of the four characteristics. The resulting average becomes the overall assessment as follows: Not Met = 1 to 1.4; Minimally Met = 1.5 to 2.4; Partially Met = 2.5 to 3.4; Substantially Met = 3.5 to 4.4; and Met = 4.5 to 5.0. We had an analyst independently rate each individual best practice and then had a supervisor verify the analyst's rating against Air Force documentation. Finally, we sent our analysis to the Air Force for feedback and gave the Air Force an opportunity to provide additional documentation if it disagreed with our scores. We shared this detailed analysis with the Air Force, and it agreed with our assessment.

We reviewed DOD and Air Force documentation and met with knowledgeable officials to understand the process leading to the fiscal year 2015 A-10 divestment proposal and how DOD has evaluated options for CAS over the years. To describe the process, including any consideration of alternatives, and priorities that led to the Air Force's A-10 divestment proposal, we reviewed Air Force briefing slides and classified reports summarizing the priorities, assumptions, and scenarios used to assess several fiscal year 2015 budget options. To describe how DOD has evaluated options for redistributing CAS responsibilities, including the feasibility of transferring the A-10 fleet to the Army or Marine Corps, we reviewed historic documents—such as the Key West agreement of 1948—and interviewed knowledgeable Air Force, Army, and Marine Corps officials. Due to the potentially large number of proposals for redistributing CAS force structure and service responsibilities over the years, we limited our scope to a selection of proposals that originated

from DOD and were reviewed by the senior-most levels of the department. In addition, we vetted our time line of key CAS events with historians from the Naval History and Heritage Command and the Air Force Historical Support Division. We did not have representatives from the Army Center of Military History and the Marine Corps History Division review the time line but believe our analysis of historic documents, input from other service historians, and interviews with officials from the Army and Marine Corps were sufficiently reliable for our purposes of describing a select history of CAS from World War II to the present day.

We interviewed officials across DOD and the services to determine whether our assessment of DOD information was factually accurate and obtained input, as appropriate, from the following offices:

- Office of the Secretary of Defense, Cost Assessment and Program Evaluation;
- Office of the Under Secretary of Defense for Acquisition, Technology and Logistics;
- Office of the Director, Operational Test and Evaluation
- Joint Staff;
- U.S. Central Command, U.S. European Command, U.S. Pacific Command, U.S. Forces Korea, and U.S. Special Operations Command; and
- U.S. Air Force, Army, Navy, and Marine Corps.

To better understand training and operational issues relevant to the A-10, we met with units at Davis-Monthan, Nellis, and Osan Air Force bases, as well as the 175th Wing of the Maryland Air National Guard. We chose these locations based on factors such as the training and operational expertise resident in some of these locations and discussions with Air Force officials.

We conducted this performance audit from June 2015 to August 2016 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 our audit objectives.

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# Appendix IV: Missions Conducted by the A-10

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This appendix contains information on the three primary missions currently assigned to the A-10 as well as the role it plays supporting the training of Joint Terminal Attack Controllers. Each section begins with a definition of the mission, the mission's relevance, and the A-10's role in the mission, including potential impacts of A-10 divestment. The A-10 is required to be proficient in its primary missions – Close Air Support (CAS), Forward Air Controller (Airborne) (FAC(A)), Combat Search and Rescue – Sandy (CSAR-Sandy)—and familiar with its secondary missions—Counter Fast Attack Craft/Fast Inshore Attack Craft (CFF) and Air Interdiction (AI).<sup>1</sup> We excluded further discussion of the secondary missions in this appendix because they are classified. The additional details can be found in the classified version of this report (GAO-16-525C).

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<sup>1</sup>The Air Force defines mission priority as follows:

**Proficient** - Aircrews have a thorough knowledge of mission area but occasionally may make an error of omission or commission. Aircrews are able to operate in a complex, fluid environment and are able to handle most contingencies and unusual circumstances. Proficient aircrews are prepared for mission tasking on the first sortie in theater.

**Familiar** - Aircrews have a basic knowledge of mission area and may make errors of omission or commission. Aircrews are able to operate in a permissive environment and are able to handle some basic contingencies and unusual circumstances. Familiar aircrews may need additional training prior to first mission tasking.

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Primary Mission – Close Air Support (CAS)

**Mission Description**

Air action by fixed-wing and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of those forces.

**Mission Relevance**

Ground commanders have relied on CAS to supply the majority of their fire support in combat operations over the last 12 years, according to the Joint Staff. CAS provides ground commanders with flexible and responsive support and, under some circumstances—including airborne assaults, counter-insurgency operations, and special operations—may be the only fire support available. The Air Force is the primary supplier of CAS to the Army. Unlike some missions where there are defined targets in known locations, CAS is a dynamic mission whose needs change depending on the actions and interactions of enemy and friendly ground forces, making it more difficult to model, according to Air Force officials.

**A-10 Role in Mission**

A-10 divestment could result in a reduction in Air Force CAS expertise. Department of Defense (DOD) doctrine and officials across DOD identify training as a key condition for effective CAS. DOD doctrine states maintaining proficiency through training allows aircrews to adapt to rapidly changing conditions in the operational environment. Although many platforms have performed CAS in the past decade, A-10 pilots are considered the Air Force's CAS experts due to the amount and depth of their CAS training. The A-10 pilots' CAS focus begins at initial qualification training, where they spend significantly more time focused on CAS in their lectures, simulator training, and sorties than pilots of other Air Force CAS-capable fighters. During initial qualification training, pilots of multi-role platforms, such as the F-16 and F-15E, receive a comparatively smaller fraction of CAS training because of the many other missions on which they must focus. This differential in CAS focus extends to yearly training requirements and through the advanced-level Weapons Instructor Course, which is the graduate-level training for elite Air Force pilots. Fewer sorties are required to retain CAS proficiency in the F-15E, F-16 and F-35A than in the A-10. In the advanced-level Weapons Instructor Course, A-10 pilots fly more CAS sorties and train against far more complex CAS scenarios than other Air Force fighter pilots. Table 6 summarizes the training sortie requirements for pilots of Air Force CAS-

capable fighters along with the mission priority of CAS for each aircraft type.

**Table 6: Close Air Support Pilot Training Requirements**

	A-10	F-15E	F-16 (Block 25-42)	F-16 (Block 50/52)	F-35A
<b>Training requirements (numbers of sorties)</b>					
Initial qualification training	8	0	3	3	N/A <sup>b</sup>
Yearly training <sup>a</sup>	22	12	12	4	12
Advanced training <sup>c</sup>	9	3	4	4	N/A <sup>b</sup>
CAS Mission Priority	Primary	Primary	Primary	Secondary	Primary

Source: GAO analysis of Air Force information. | GAO-16-816

<sup>a</sup>Yearly sortie requirements listed are for active duty inexperienced pilots out of a total 108-sortie requirement. Yearly sortie requirements can vary by experience level (inexperienced/experienced) and by component (Active Component/Air National Guard/Air Force Reserve Component). Further, the Air Force notes that, as the F-35 matures, additional system capabilities will shift the balance of sorties and missions accordingly.

<sup>b</sup>N/A – Syllabus identifying sortie requirements not yet finalized.

<sup>c</sup>Advanced training is from the Weapons Instructor Course, which Air Force officials describe as graduate-level training for elite Air Force pilots.

CAS expertise becomes more important as conditions become more complex, according to Air Force officials. However, much of the CAS provided over the last decade in Afghanistan and Iraq has been in environments where threats to the aircraft were low, where CAS often consisted of dropping bombs on coordinates, and where squadrons had months to prepare for their CAS-focused deployments, according to Air Force officials. The CAS experts convened by the Air Force in 2015 found that a broad range of aircraft have become good at providing CAS in these permissive environments. The advantages of A-10 CAS expertise may not be as significant under these circumstances but become more pronounced in contested environments when a wider CAS skillset is needed, according to Air Force and combatant command officials and DOD is planning on conducting CAS in contested environments in the future.

Loss of the A-10 airframe will also cause a decrease in Air Force CAS capability. Senior DOD leaders have stated that the A-10 is the Air Force’s best CAS aircraft. The CAS experts convened by the Air Force in 2015 concluded that A-10 divestiture creates a gap because the Air Force is losing a high-capacity and cost-efficient ability to kill armor, moving,

and close proximity targets in low weather conditions. Table 7 provides a summary of some A-10 CAS advantages.

Although the A-10 has a number of advantages that are highlighted in table 7, the dynamic nature of CAS means that other aircraft also have some advantages. For example, although the A-10 has a relatively long loiter time and large weapons capacity, a B-1 bomber far exceeds both. While acknowledging the capabilities of other aircraft, officials from the Air Force and combatant commands emphasized that A-10 capabilities stand out in circumstances where enemy forces are close to friendly forces, there are moving and armored targets, and the weather is bad.

**Table 7: Examples of A-10 Close Air Support (CAS) Capability Advantages Under Certain Conditions**

Capability advantage	Examples
Austere airfield operations	A-10s are the only Air Force fighter capable of operating from small, austere airfields. This capability advantage allows A-10s to be stationed closer to ongoing operations where CAS is needed. In the beginning of Operation Enduring Freedom, A-10s were the only Air Force fighter aircraft able to utilize Bagram Air Force Base. Recently, A-10s supported European Command by operating from small, austere Soviet-era airfields in Bulgaria, Estonia, and Poland that are unusable by other Air Force fighters. In April 2016, Pacific Command began using A-10s to support operations in the Philippines, in part because of their ability to operate from short and austere airstrips.
Weapons diversity	The variety and amount of weapons that the A-10 can carry makes it flexible and responsive in dynamic CAS situations. The standard A-10 weapons load includes bombs, Maverick missiles, rockets, and 30 mm cannon, allowing it to engage a wider variety of targets than other Air Force fighters, including armored and moving targets and targets very close to friendly forces. In comparison, the standard weapons load for the F-16 and F-15E includes a 20mm cannon and bombs. The A-10's weapon diversity often allows it to be more capable of delivering CAS than other fighters, according to Special Operations Command officials.
Weapons capacity	The A-10 can engage more CAS targets per sortie than other Air Force CAS fighters. A-10s and F-16s have generally carried four 500 pound bombs but the A-10s have also carried rockets and the Maverick missile and enough ammunition for 10 strafing passes with its cannon, as compared to 3 passes for the F-16. This means an A-10 can target 15-17 targets per sortie compared to 7 for the F-16. F-15Es generally carry more bombs than the A-10 (8-10 500 pound bombs) and enough ammunition for 3 strafing passes, allowing it to target 11-13 targets per sortie. Based on differences in weapons capacities, planners must adjust the number of sorties for each type of fighter to engage the same number of targets.
Inclement weather	The slower speed of the A-10 makes it capable of providing CAS in environmental conditions when other platforms cannot. High speed aircraft cannot operate effectively below the weather either day or night, unless the terrain is extremely favorable (i.e. relatively flat and free of obstructions). The A-10 can maneuver and operate in much more restrictive airspace than high speed aircraft like the F-15E or F-16. When weather, terrain, or a combination of the two limit other fixed wing aircraft to dropping GPS-guided weapons from high altitudes onto coordinates, the A-10 can function below the weather, maintain awareness of friendly and enemy positions, and employ a wide range of weapons as the tactical situation dictates. The ability to operate in unfavorable weather conditions is an important advantage in places like Korea, according to U.S. Forces Korea officials.

Source: GAO analysis of DOD documents and other information provided by DOD officials. | GAO-16-816

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Primary Mission – Forward Air Controller (Airborne) (FAC(A))

**Mission Description**

A specifically-trained and qualified aviation officer who exercises control from the air of aircraft engaged in CAS of ground troops. The FAC(A) also provides coordination and terminal attack control for CAS missions, as well as locating, marking, and attacking ground targets using other fire support assets.

**Mission Relevance**

FAC(A)s are CAS experts that help to efficiently manage air-to-ground operations. This role is challenging because FAC(A)s must first understand a dynamic situation on the ground and then determine the best way to support the ground commander utilizing available air (e.g. F-15E, MQ-1, A-10) and ground-based assets (e.g. artillery) that each have unique capabilities and limitations. According to Air Force officials, the Air Force generally chose not to use FAC(A)s during operations in Iraq and Afghanistan. However, according to Air Force officials, FAC(A)s would be invaluable during contested CAS operations, because they would perform reconnaissance and develop battlefield awareness under conditions where intelligence and communications would be much more limited than they have been in Iraq and Afghanistan. FAC(A)s are also important in cases where there are not enough qualified Joint Terminal Attack Controllers authorized to control coalition and allied aircraft, according to Air Force officials. FAC(A)s can also help coordinate actions in a very crowded airspace. In addition, FAC(A)s have a much broader view of the battlespace than Joint Terminal Attack Controllers, which is important in a major conflict, according to combatant command officials. FAC(A)s can also be a significant force multiplier and risk mitigation tool to compensate for an inevitable decline in Air Force CAS proficiency associated with the transition to a multi-role fighter force, according to Air Force officials. FAC(A)s could do so by providing training expertise to pilots in their home squadrons and by managing the CAS fight when operationally deployed.

**A-10 Role in Mission**

A-10 divestment could result in a reduction in Air Force FAC(A) expertise. All DOD FAC(A)s are required to meet minimum training requirements for certification and qualification retention as established in a memorandum

of agreement.<sup>2</sup> However, Air Force FAC(A) training requirements are higher for A-10 pilots than for those of other Air Force aircraft.<sup>3</sup> A-10 FAC(A)s are required by the Air Force to be mission proficient whereas F-16 FAC(A)s and future F-35 FAC(A)s are only required to be familiar with the mission. A-10 FAC(A)s are required to conduct four times as many yearly training sorties as F-16 FAC(A)s and almost three times as many as future F-35 FAC(A)s.<sup>4</sup> In addition, the A-10 program is the only Weapons Instructor Course that requires all entering students to be FAC(A) qualified and has a training phase specifically dedicated to FAC(A). Moreover, Air Force officials told us that the skills needed for the FAC(A) mission build upon CAS skills. As a result, A-10 pilots have a more robust foundation upon which to build their FAC(A) expertise. The Air Force has not determined the significance of any lost FAC(A) expertise that may be associated with A-10 divestment.

A-10 divestment could also result in a decrease in the number of Air Force FAC(A)s. All A-10 fighter squadrons and some F-16 fighter squadrons are assigned a minimum number of FAC(A) pilots on a squadron-by-squadron basis. Although the F-35's advanced networking and sensor capabilities could make it well suited for the FAC(A) role, according to Air Force and Joint Staff officials, the Air Force has not yet determined how many FAC(A)s its F-35 squadrons will be required to have. Currently, approximately half of the Air Force FAC(A) needs are filled by A-10 pilots. The Air Force does not centrally track the number of

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<sup>2</sup>FAC(A) Memorandum of Agreement -2015 – signed by representatives of the Joint Staff, Army, Air Force, Marine Corps, Navy, Special Operations Command, and the Royal Australian Air Force. Certification requires a minimum of 12 controls and retaining qualification requires 6 controls in each 6-month period. For certification, 6 out of the 12 controls can be done in accredited simulators. To retain qualifications, 4 out of 6 controls can be done in accredited simulators.

<sup>3</sup>The Air Force has guidance unique to each aircraft type that outlines yearly training requirements for pilots - called the Ready Aircrew Program Tasking Memorandum. For aircraft that have FAC(A) as a mission, this guidance states that FAC(A) qualified pilots must, at minimum, meet the requirements of the FAC(A) Memorandum of Agreement. However, Air Force specific training requirements for different aircraft can exceed that minimum.

<sup>4</sup>Specific yearly sortie requirements can vary by level of expertise and component (Active Component, Air National Guard, and Air Force Reserve Component). An active component inexperienced FAC(A) A-10 pilot is required to complete 16 FAC(A) sorties per year whereas a similar F-16 and F-35 pilot is required to complete 4 and 6 sorties respectively.



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FAC(A) pilots it has and has not established a requirement for the number of FAC(A)s it will need in the future.

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Primary Mission – Combat Search and Rescue (CSAR) – Sandy

**Mission Description**

Tactics, techniques, and procedures performed by forces to recover isolated personnel from hostile or uncertain operational environments. The Sandy mission involves aircraft and pilots specifically trained to coordinate rescue action, escort helicopters on combat rescue missions, and suppress enemy forces.

**Mission Relevance**

CSAR is a highly dynamic and unpredictable mission, unique from other rescue missions in that it is done with little warning, deep in hostile territory, and requires searching for the survivor's location, according to Air Force and combatant command officials. CSAR-Sandy is a subset of the CSAR mission that requires pilots who are specifically trained to coordinate rescue missions, escort helicopters, and suppress enemy forces. According to Air Force and combatant command officials, there is an enduring requirement for CSAR, including CSAR-Sandy. It is not a mission whose value is easily quantified but they noted that it is part of the ethos of the U.S. military that no servicemember will be left behind. The CSAR-Sandy mission is one way the military fulfills that promise, according to the officials. Moreover, it helps morale and encourages pilots to remain aggressive when conducting their missions. Officials from three combatant commands indicated that their commands have a requirement for CSAR-Sandy forces. Further, CSAR capabilities are very important for assuring potential partner nations and facilitating their participation in operations. According to officials from one command, partner nations often want U.S. CSAR capabilities to be available before agreeing to join in operations.

### A-10 Role in Mission

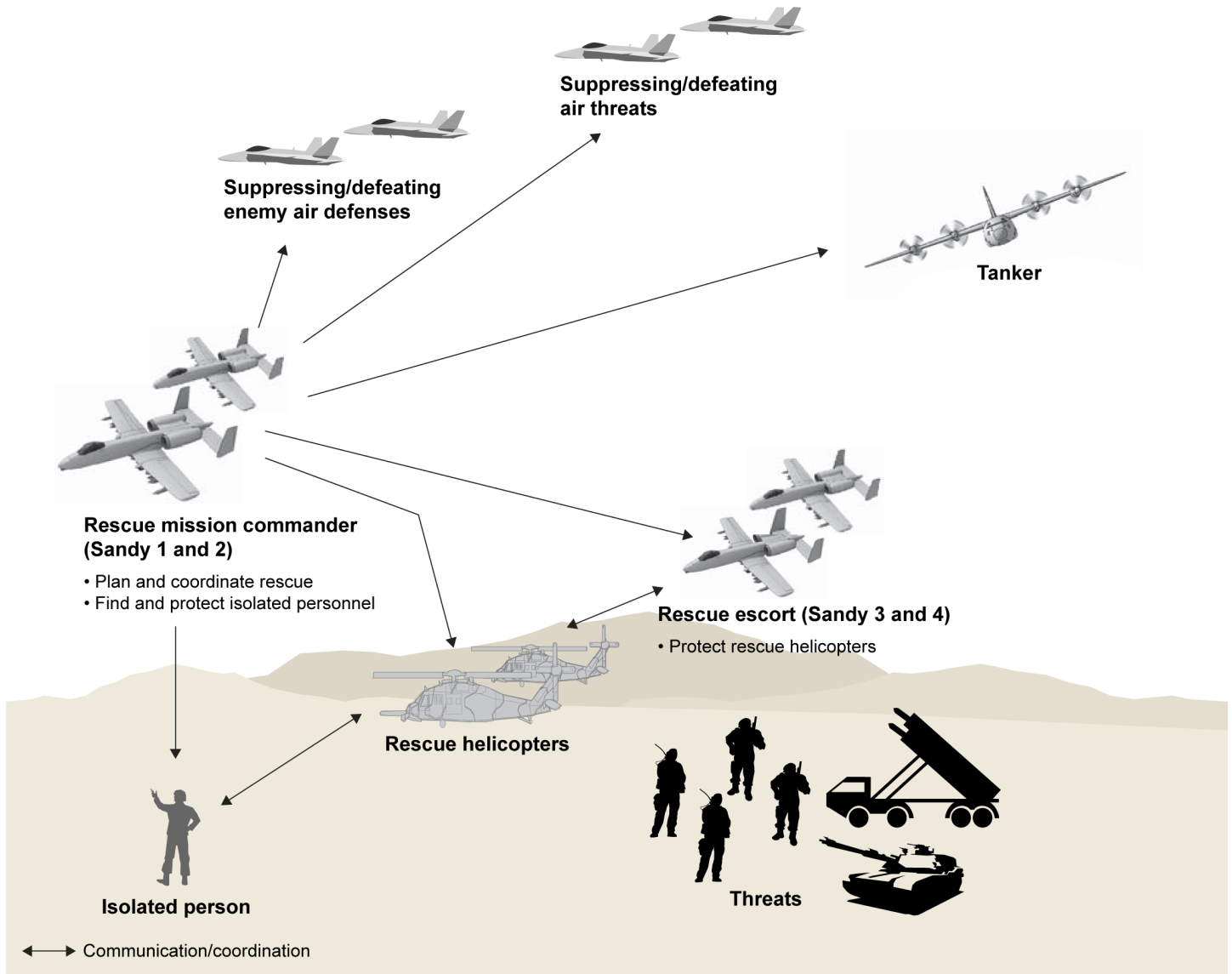
The A-10 is currently the only DOD platform assigned this mission and every combat-coded A-10 squadron has CSAR-Sandy qualified pilots.<sup>5</sup> A-10s typically conduct the CSAR-Sandy mission using four aircraft designated Sandy 1 through Sandy 4. Sandy 1 - the Rescue Mission Commander – controls recovery efforts and provides protection of the isolated personnel from ground threats.<sup>6</sup> This is a complex task that includes responsibility for planning and directing the actions of all ground forces, air forces, and supporting forces involved in the rescue, including the HH-60 rescue helicopters, aircraft suppressing enemy air defenses, and tankers. Sandy 2 assists the Sandy 1 and acts as the FAC(A), clearing the rescue area of potential threats. Sandy 3 and 4 conduct rescue escort with responsibilities that include conducting reconnaissance, escorting rescue vehicles and helping them navigate the safest possible route, providing communications relay, and finding and neutralizing threats. Helicopters are very vulnerable to small arms fire and so there are many potential threats. According to rescue group officials, qualified Sandy-trained pilots are vital for combat search and rescue capabilities. They also said that a drop in Sandy-trained pilots would restrict the ability of rescue groups to conduct CSAR in volatile environments. Figure 9 provides an example of a CSAR mission and the Sandy roles.

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<sup>5</sup>The U.S. Navy has a limited number of aircrews with some Rescue Mission Commander training—one of the CSAR Sandy roles—in each Carrier Air Wing, but they do not have a qualification and the training is not as in depth as A-10 training, according to officials from the Air Force and Navy. Navy training focuses mainly on supporting Carrier Strike Group operations and not combatant command requirements. The U.S. Navy Rescue Mission Commanders train mostly with U.S. Navy rescue vehicles for maritime operations whereas A-10s train with a variety of rescue vehicles from multiple services, according to the officials.

<sup>6</sup>Joint Chiefs of Staff, Joint Publication 3-50, *Personnel Recovery* (October 2015)

Figure 9: Example of a Combat Search and Rescue (CSAR) Mission, Including the Sandy Communication and Coordination Role



Source: GAO analysis of Department of Defense information. | GAO-16-816

Developing CSAR-Sandy qualified pilots requires a lot of training due to the complexity of the mission and the training builds upon skills developed during CAS and FAC(A) training, according to Air Force

officials. A-10 pilots that become Sandy-qualified start at Sandy 4 and then work up to Sandy 1 (Rescue Mission Commander), which can take 5-10 years, according to Air Force officials. Sandy 1 and 2 pilots are required to fly a minimum of 12 CSAR training sorties per year in addition to their CAS sorties.<sup>7</sup> A-10 pilots must be Sandy 1-qualified to participate in the A-10 Weapons Instructor Course, which officials described as the graduate level training. During the program, students fly five CSAR-related sorties spanning 10 hours, attend five lectures on CSAR, and participate in a 30-hour practicum that focuses on CAS and CSAR. Gaining and retaining CSAR-Sandy qualification is resource intensive because it requires many aircraft, according to Air Force and combatant command officials.

The A-10 platform has certain capabilities that make it well suited for the CSAR-Sandy mission. A-10s are well suited for the Sandy 1 (Rescue Mission Commander) role because of their long loiter time and large communications suite. The A-10 is currently the only Air Force fighter with a radio designed to locate and communicate with DOD's hand-held emergency radio. A-10 platform characteristics are also useful for the Sandy 3 and 4 roles, where rescue escort aircraft must respond quickly. A-10s are survivable and can fly low and slow, and are able to stay close to the rescue helicopters so they can quickly identify and respond to threats. The A-10's forward-firing munitions – the 30 mm gun, missiles, and rockets – and tight turning radius allow it to quickly engage and re-engage a variety of targets. A rescue aircraft pilot gave an illustrative example of how, when he is flying at 300 feet and identifies a possible threat ahead, rescue escort A-10s quickly come beside his aircraft, locate the potential target, and take care of it. Other jets fly higher and faster and rely on their targeting pods. The pilot said that he is often over or beyond the potential threat by the time other jets are able to locate it.

The Air Force has not formally determined what aircraft, if any, will replace the A-10 for the CSAR Sandy mission. Should the Air Force remain committed to this mission it will need to identify another platform

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<sup>7</sup>Minimum sortie requirements differ by experience level and component. Inexperienced active component Sandy 1 and 2s are required to fly a minimum of 12 CSAR sorties per year and experienced active component Sandy 1 and 2s are required to fly 10. Air National Guard Sandy 1 and 2s are required to fly 6 CSAR sorties per year, regardless of experience.

to take on this responsibility, but, according to Air Force officials, there is no obvious replacement for the A-10. The Air Force assessed the feasibility of using F-16s or F-15Es for the CSAR-Sandy 1 role and concluded that aircrews for both aircraft would require extensive training and that their existing missions would prevent such training. Combatant command officials echoed the finding that other aircraft could not be prepared to conduct the CSAR-Sandy mission along with their current missions. The Air Force assessment, completed in September 2015, recommended that F-15E and F-16 aircrews not be tasked with the Sandy 1 role without adequate training, and noted that the aircraft required communications gear, survivability systems, and weapons upgrades. The Air Force has not taken formal actions on these findings, according to Air Force officials.

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Other Support – Joint Terminal  
Attack Controller Training

**Joint Terminal Attack Controllers Mission**

Joint Terminal Attack Controllers are qualified (certified) servicemembers who, from a forward position, direct the action of combat aircraft engaged in CAS and other offensive air operations.

**Joint Terminal Attack Controller Significance**

Demand for Joint Terminal Attack Controllers has grown significantly over the last decade and exceeds supply, according to DOD data. The Air Force has the largest number of Joint Terminal Attack Controllers in DOD, and according to Air Force officials, Air Force Joint Terminal Attack Controllers provide a vital link between the Army and the Air Force. Air Force Joint Terminal Attack Controllers serve in Army units, advising ground commanders and directly calling in air support. Army officials said they do not anticipate a decrease in the Army's requirement for Joint Terminal Attack Controllers.

**A-10 Role in Supporting Joint Terminal Attack Controller Training**

A-10 divestment could negatively affect the Air Force's ability to train Joint Terminal Attack Controllers. Joint Terminal Attack Controllers must conduct a minimum number of CAS "controls"—calling in of airstrikes—to be certified or to maintain their qualification.<sup>8</sup> Getting aircraft to support Joint Terminal Attack Controllers training has been increasingly difficult, especially as the number of Joint Terminal Attack Controllers has risen and the aircraft inventory has declined. According to the Joint Staff, the A-10 divestment will compound training shortfalls already being felt. The loss of A-10 training support is disproportionate to the number of aircraft being divested because the A-10 provides a significant portion of Joint Terminal Attack Controller certification training and qualification training. From March 2010 to March 2016, A-10s provided 44 percent of aircraft support for Air Force Joint Terminal Attack Controller certification training, according to Air Force data. Air Force officials said they do not centrally track qualification training but A-10 support levels are similar to

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<sup>8</sup>The 2015 Joint Terminal Attack Controller Memorandum of Agreement between the Joint Staff and U.S. military services, U.S. Special Operations Command, and military services from 18 foreign countries identifies the minimum number of controls required for initial certification and yearly requirements for maintaining qualification.

certification training. Officials from several combatant commands also stated that A-10s provide significant support for Joint Terminal Attack Controller training. The F-35's ability to make up for some of this capacity loss is limited by its inability to use inexpensive and light training munitions that allow aircraft to support more training CAS controls. It also currently lacks video downlink and infrared pointer capability often used in CAS and therefore also important for training. The Air Force also has not yet determined the extent to which it will be able to link F-35 and Joint Terminal Attack Controller simulators, according to officials from the Air Force and Joint Staff. Further, the F-35 has a large number of missions and the extent to which limited flight hours will be made available to support Joint Terminal Attack Controller training is unknown at this point.

The quality of Joint Terminal Attack Controller training support provided by the A-10 community is better than that provided by other Air Force aircraft, according to DOD officials. The A-10's wide variety of ordnance gives Joint Terminal Attack Controllers more options and allows them to deal with a larger variety of situations. DOD officials involved with Joint Terminal Attack Controller training told us that A-10 pilots generally provide better training because of their CAS expertise, knowledge of the standards, and an understanding of how ground forces operate. Officials provided an illustrative example comparing Joint Terminal Attack Controller qualification training support provided by A-10 pilots and pilots from a different Air Force fighter community. A-10 pilots often use detailed notes, maps, and data in detailed debriefs that can last several hours after Joint Terminal Attack Controller training. In the counter-example, the training debrief provided by the pilots from a different fighter community lasted several minutes and involved no notes. The officials ascribed the difference to a difference in culture, where A-10s are closely tied to ground forces and other fighters generally are not. A-10s are also better positioned to support Joint Terminal Attack Controller training going forward as Joint Terminal Attack Controllers expand their training focus to, once again, include CAS in contested environments, according to Air Force officials. In addition, officials from EUCOM and U.S. Pacific Command said partner nations often request A-10 support for their Joint Terminal Attack Controller training, and this support is an important component of their theater cooperation efforts.



# Appendix V: Comments from the Department of Defense



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SECRETARY OF THE AIR FORCE  
WASHINGTON

JUN 21 2016

Mr. John Pendleton  
Director, Defense Capabilities and Management  
U.S. Government Accountability Office  
441 G Street, NW  
Washington, DC 20548

Dear Mr. Pendleton,

(U) Thank you for the opportunity to provide the Department of Defense response to the Government Accountability Office Report GAO-16-525C, "Force Structure; Better Information Needed to Support Air Force A-10 and Other Future Divestment Decisions." I request that DoD's views be incorporated in this report.

(U) As the Department of Defense's lead agency for responding to the three recommendations made within the report, I provide the following comments in Attachment 1. My point of contact for this report is Lt Col Jason Cockrum, AF/A3XC, 703-692-1812; Jason.J.Cockrum.mil@mail.smil.mil.

Sincerely,

  
Deborah Lee James

Attachment:  
(U) Air Force response to the GAO recommendations (S/NF)

cc:  
AF/CC

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ATTACHMENT 1  
SECAF LETTER OF TRANSMITTAL

GAO REPORT DATED JULY 2016 (GAO-16-525C)

**'FORCE STRUCTURE: BETTER INFORMATION NEEDED TO SUPPORT AIR  
FORCE A-10 AND OTHER FUTURE DIVESTMENT DECISIONS'**

**AIR FORCE COMMENTS TO THE GAO RECOMMENDATION**

(U) RECOMMENDATION 1: To make a well-informed decision about the future of its A-10 aircraft, we recommend that before again recommending divestment of the A-10, the Secretary of the Air Force:

- Develop quality information that fully identifies gaps in capacity or capability that would result from A-10 divestment, including the timing and duration of any identified gaps, and the risks associated with those gaps; and
- Use that information to develop strategies to mitigate any identified gaps.

(U) AIR FORCE RESPONSE: The Air Force non-concurs with this recommendation, as it asserts that the service did not provide the necessary information to fully identify gaps in capacity and capability that would result from the A-10 divestment. The Air Force considered multiple analyses that showed divesting any platform from the current Air Force inventory would result in capability and capacity gaps. This report fails to highlight that Air Force analysis, detailed in the "AF/A9 FY15 Alt POM/POM Analytic Report To Support President's Budget 2015," indicated the A-10 divestment was the most acceptable strategy to remain within the Air Force budget authority while controlling risk across all Air Force mission sets. Furthermore, in the Air Force's "Report to Congressional Committees: Close Air Support Requirements," the Air Force specifically states the clear understanding of the CAS capability of the A-10 relative to other platforms as well as the capacity risk incurred from A-10 divestment. Therefore, the Air Force takes exception to the assertion that it made the decision to divest the A-10 without knowledge or understanding of the associated risk and capability gaps. Additional details of this response are excluded due to classification. Additional details can be found in the classified version of this report (GAO-16-525C).

(U) RECOMMENDATION 2: In addition, to further inform decisions about the future of the A-10, we recommend the Secretary of the Air Force, in considering divestment, develop a high-quality, reliable cost estimate utilizing best practices.

(U) AIR FORCE RESPONSE: The Air Force non-concurs with the characterization that such criteria was not used in the A-10 divestment considerations. When considering this difficult

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decision the Air Force used high quality internal data to develop accurate cost estimates based on existing best practices. Additional details of this response are excluded due to classification. Additional details can be found in the classified version of this report (GAO-16-525C).

(U) RECOMMENDATION 3: As the DoD faces future decisions on how to balance its existing capabilities and capacities against future modernization requirements, it will need quality information to help inform such decisions. To ensure that senior leaders have the quality information on which to base future force structure decisions, we recommend the Secretary of Defense develop and promulgate department-wide guidance that establishes specific informational requirements to be met before proposing divestment of major weapon systems that have not reached the end of their expected service lives. This guidance should require identifying gaps in capacity or capability that will occur for the proposing service and any other service if the divestment proposal is approved; recommending strategies for mitigating any identified gaps; and developing a high-quality, reliable cost estimate of the major weapon system proposed for divestment that can be used to identify alternatives for achieving similar savings.

(U) DEPARTMENT OF DEFENSE RESPONSE: The DoD non-concurs with this recommendation. While there is certainly a requirement to provide senior leaders with quality information on which to make force structure decisions, the DoD already has robust procedures in place to provide this information, and additional department-wide guidance that establishes specific informational requirements to be met before proposing divestment of major weapon systems is unnecessary and would be ineffective. The circumstances surrounding a divestment or recapitalization decision are always unique to the specific weapon system under consideration. Service life definitions vary between air, space, sea, undersea, and land platforms. Capability, capacity, threat analysis, modernization potential, reliability, cost, service life remaining, and obsolescence are among the unique factors that the DoD may consider when making force structure decisions regarding a specific platform. These factors are all considered through the Planning, Programming, Budgeting, and Execution (PPBE) process, and in conjunction with the Joint Capabilities Integration & Development System (JCIDS) and the Defense Acquisition System. The DoD conducts a rigorous Analysis of Alternatives (AoA) prior to developing any new weapon system to fill a validated requirement. In cases where the validated requirement involves replacing existing capabilities, one alternative that is always analyzed is continuing or extending the existing Program of Record (PoR). This analysis identifies gaps in capability and capacity, mitigates those gaps, and uses well established best practices to develop cost estimates for existing and potential new systems. The DoDs established processes provide senior leaders with quality information on which to base both acquisition and divestment decisions.

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# Appendix VI: GAO Contact and Staff Acknowledgments

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## GAO Contact

John Pendleton, (202) 512-3489 or [pendletonj@gao.gov](mailto:pendletonj@gao.gov).

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## Acknowledgments

In addition to the contact named above, Michael Ferren, Assistant Director; Tracy Barnes, Laurie Choi, Nicolaas Cornelisse, Travis Masters, Amie Lesser, Karen Richey, Michael Silver, Matthew Spiers, Erik Wilkins-McKee, and Edward Yuen made key contributions to this report.

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