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CONGRESSIONAL BUDGET OFFICE

CBO

The Cost of Replacing Today's Air Force Fleet

DECEMBER 2018

Notes

The years referred to in this report are federal fiscal years, which run from October 1 to September 30 and are designated by the calendar year in which they end.

All costs are expressed in 2018 dollars. For the years before 2018, costs are adjusted for inflation using the gross domestic product price index from the Bureau of Economic Analysis. Costs for years after 2018 are adjusted for inflation using the Congressional Budget Office's projection of that index.

On the cover: An F-15C Eagle during takeoff. U.S. Air Force photo by Staff Sergeant Joe W. McFadden.

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The Cost of Replacing Today's Air Force Fleet

Summary

The U.S. Air Force has about 5,600 aircraft, which range in age from just-delivered to 60 years old. Many of those aircraft—including the costly-to-replace F-16C/D and F-15C/D fighters, F-15E multirole fighters, C-130 cargo aircraft, and B-1B bombers—are nearing the end of their service life. In this report, the Congressional Budget Office estimates the cost of replacing those aircraft.

- **Replacement Costs.** CBO projects that replacing the aircraft in the current fleet (essentially one-for-one) would cost an average of $15 billion a year in the 2020s. That figure would rise to $23 billion in the 2030s and then fall back to $15 billion in the 2040s. In comparison, appropriations for procuring new aircraft averaged about $12 billion per year between 1980 and 2017. (All amounts are in 2018 dollars.)

- **Methods.** The projections are based on publicly articulated procurement plans for some aircraft and, for aircraft without such plans, on their typical retirement age; the projections do not take into account the costs of development, operations and maintenance, modifications, or personnel associated with aircraft.

- **Uncertainty.** Replacement costs would be lower if the Air Force decided to extend the service life of some aircraft or if the costs of procuring some aircraft were lower than CBO projects. Replacement costs would be higher if the opposite occurred.

Today's Air Force Aircraft and Their Replacement Costs

The Air Force's fleet includes about 2,000 fighter and attack jets; 150 long-range bombers; 1,100 airlift, cargo, and utility planes; 450 tankers; 500 reconnaissance and electronic warfare aircraft; 1,200 trainer planes; and 150 helicopters and tiltrotors.[1] Those aircraft perform different missions (see Box 1 and the appendix). They range widely in age from the 75 new aircraft that entered service in 2017 to the 21 60-year-old KC-135 tankers that entered service in 1958. The largest share of the fleet is 26–30 years old; those aircraft entered service in the late 1980s and early 1990s, funded by the defense buildup of the 1980s (see Figure 1).

Because the future national security environment and future Air Force budgets are unknown, projections out to 2050 are quite uncertain. A system's retirement may be accelerated or postponed, or it may be retired and not replaced. Increased capabilities of new aircraft may also allow for less than CBO's default assumption of one-for-one replacement of existing aircraft. Moreover, new systems that do not replace existing systems may emerge, such as the Air Force's remotely piloted aircraft (RQ-4 Global Hawk, MQ-1 Predator, and MQ-9 Reaper) that emerged in the 1990s and 2000s and did not directly replace any existing systems.

A long-range projection is nevertheless useful because it can assist the Congress, the Department of Defense, and the Air Force in setting appropriate budgets for procuring new aircraft. It can also identify key future issues—when too many programs might need procurement appropriations at the same time, for example, or when retained aircraft are growing too old—and give decisionmakers enough time to address them.

CBO projects that costs of procuring new aircraft would rise above $15 billion during the mid- to late 2020s and peak at about $26 billion in 2033. A Penetrating Counter Air (PCA) aircraft (which may replace F-15C/Ds and F-22s), the F-35A, and the B-21 would be the largest contributors to that year's peak. Costs of procuring new aircraft would not fall below $20 billion until 2039 and would remain above typical historical levels past

1. For more details about the Air Force's force structure, see Congressional Budget Office, *The U.S. Military's Force Structure: A Primer* (July 2016), Chapter 4, www.cbo.gov/publication/51535. Tiltrotor aircraft can position their rotors like a helicopter's for vertical takeoff and landing or position them like a fixed-wing aircraft's propellers for higher-speed horizontal flight.

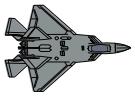
Box 1.

Major Aircraft in the Air Force's Fleet and Their Primary Functions

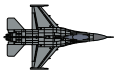
Fighter and Attack Aircraft

A-10
Close air support

F-15C/D
Air superiority



F-22
Air superiority, ground attack

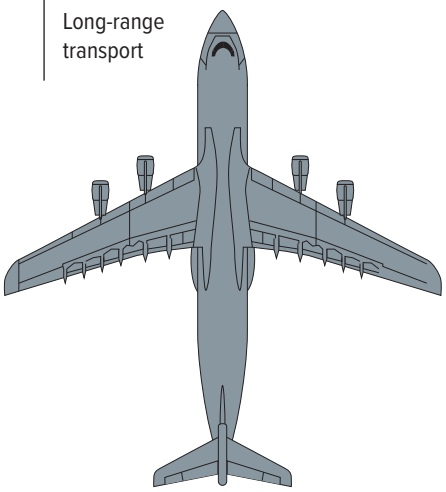


F-16
Multirole: ground attack, air superiority

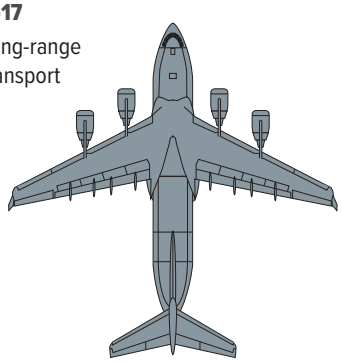
F-35A
Multirole: ground attack, air superiority

Airlift Aircraft

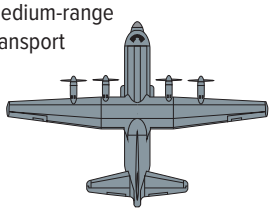
C-5
Long-range transport



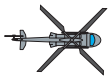
C-17
Long-range transport



C-130
Medium-range transport



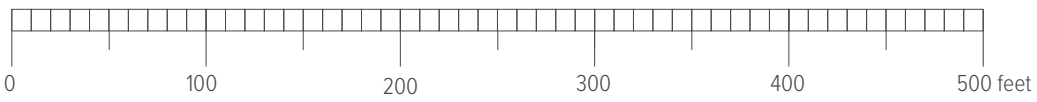
C-21
Passenger and cargo transport



UH-1
Utility transport (helicopter)

Trainer Aircraft

T-38
Advanced pilot training



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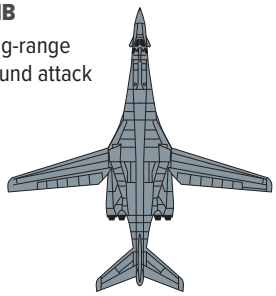
Box 1. Continued

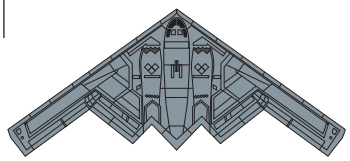
Major Aircraft in the Air Force's Fleet and Their Primary Functions

Bomber Aircraft

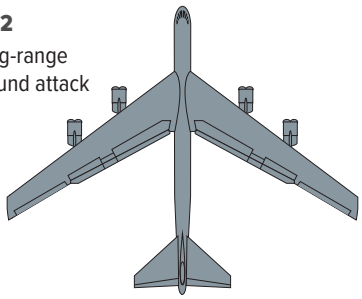
B-1B
Long-range ground attack



B-2
Long-range ground attack

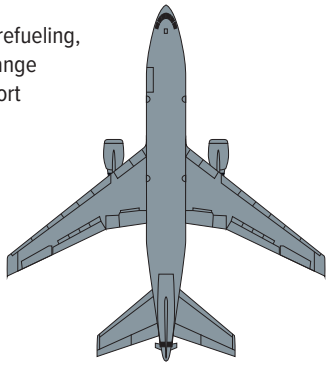


B-52
Long-range ground attack

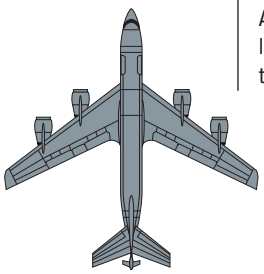


Tanker Aircraft

KC-10
Aerial refueling, long-range transport



KC-135
Aerial refueling, long-range transport

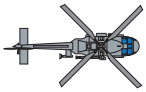


Reconnaissance Aircraft

MQ-9 Reaper
Remotely piloted reconnaissance and ground attack

RQ-4 Global Hawk
Remotely piloted high-altitude reconnaissance

Other Aircraft

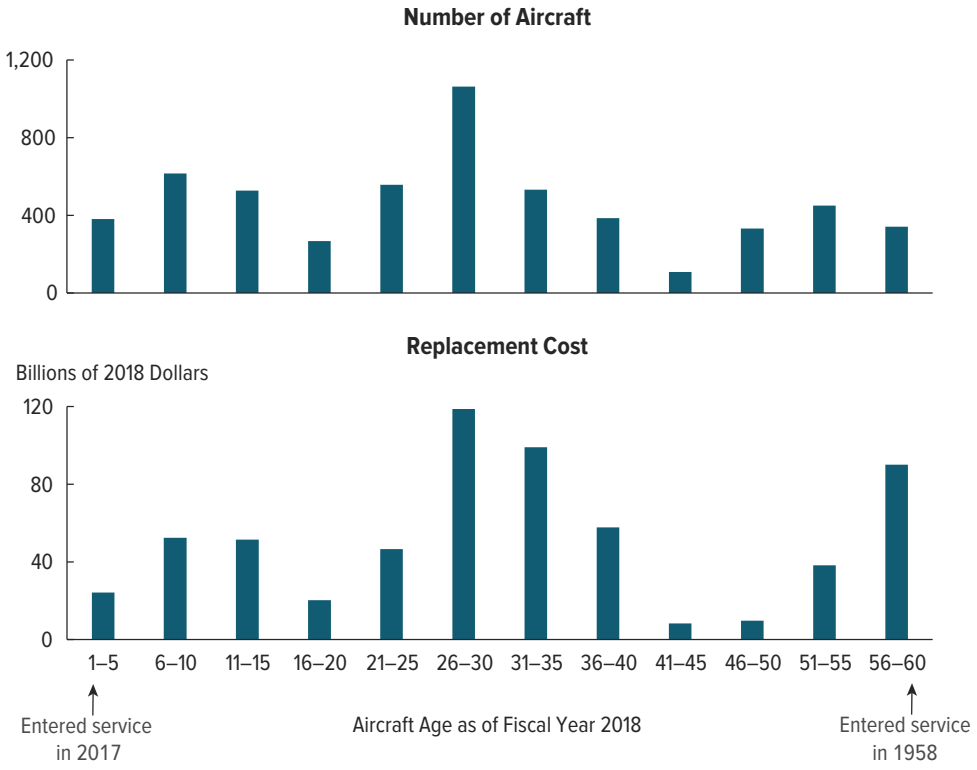


HH-60
Combat search and rescue (helicopter)

MV-22
Special Operations Forces (tiltrotor)

Figure 1.

Age and Replacement Cost of the Air Force's Fleet, 2018



Many of the aircraft in the current fleet entered service during the defense buildup that occurred during the 1980s.

The aircraft with the highest total replacement cost are about 30 years old (predominantly B-1Bs, F-15C/Ds, and F-16C/Ds).

Source: Congressional Budget Office, using data from the U.S. Air Force.

2045. Although the Air Force could probably modify both retirement plans and replacement schedules to smooth out the 2033 peak, the average annual costs of procuring new aircraft would still be higher than in the recent past: $15 billion in the 2020s, $23 billion in the 2030s, and $15 billion in the 2040s.

The Air Force's annual appropriations for procuring new aircraft peaked in 1986 at about $29 billion but then trended downward until the late 1990s (see Figure 2). In CBO's projection, the procurement costs of new aircraft would not reach the 1986 level, but they would rise to and remain at levels considerably above historical averages (see Figure 3). The Air Force's annual appropriation for procuring new aircraft averaged about $9 billion between 2010 and 2017 and about $12 billion between 1980 and 2017, including the 1980s buildup.

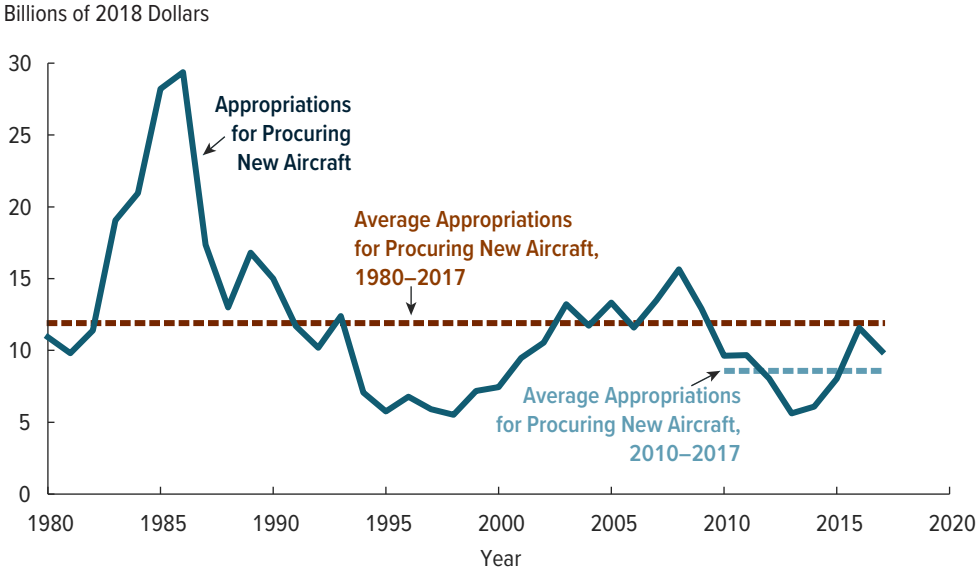
CBO's estimate includes 35 different replacement systems, but six programs make up more than 85 percent of the projected costs of procuring new aircraft: the F-35A, the PCA aircraft, the KC-46 tanker, the B-21 bomber, a C-17 replacement cargo aircraft, and the C-130J cargo aircraft. CBO projects that the F-35A would be the most expensive program through the late 2020s. When funding for procuring the PCA aircraft would be needed in the early 2030s, however, that program would become the most expensive until the late 2040s (see Figure 4).

The largest replacement costs are clustered around aircraft ages 26–30 and 31–35 years old (see the lower panel of Figure 1). Those aircraft entered service in the mid-1980s through early 1990s (most prominently, the B-1Bs, F-15C/Ds, and F-16C/Ds). Another cluster of aircraft with large replacement costs is now more than 55 years old (mostly KC-135s and B-52s).

Although CBO's projections address changes in the Air Force fleet through 2050, the agency formed no judgment about whether the new aircraft procurements in its

Figure 2.

The Air Force's Appropriations for Procuring New Aircraft, 1980–2017



The Air Force's appropriations for procuring new aircraft rose in the 2000s (but did not approach the peak seen in the 1980s) and then fell in the 2010s.

Source: Congressional Budget Office, using data from the U.S. Air Force.

analysis are necessary or appropriate. Instead, this report projects the costs to procure the aircraft in the Air Force's publicly articulated plans and to replace other aircraft on a one-for-one basis when they reach the end of their service life.[2]

How CBO Made Its Projections

CBO used three complementary approaches to project changes in the Air Force fleet through 2050 and the resulting costs of procuring new aircraft each year.

First, for some major acquisition programs (C-130J, Combat Rescue Helicopter, F-35, KC-46 aerial refueling tanker, and MQ-9 Reaper remotely piloted aircraft), the Department of Defense (DoD) has issued Selected Acquisition Reports (SARs) that summarize projected development schedules, purchase quantities, and costs for the Congress on an annual basis. CBO used those SARs when they were available. The December 2017 SAR for the Combat Rescue Helicopter (CRH), for instance, said that the CRH will replace aging HH-60 Pave Hawk helicopters and that procurement costs between 2019 and 2026 will total about $6.4 billion in 2018 dollars. CBO's projection is based on the assumption that each new aircraft would enter service two years after procurement funds for it were appropriated; therefore, the HH-60s would be retired between 2021 and 2028 as the new CRHs arrived. CBO also projects that the Air Force would then operate the CRHs for the remainder of the projection period.

Second, for some systems lacking SARs (for example, the B-21 bomber that will replace the B-1B and B-2 bombers and the T-X training aircraft that will replace the T-38C training aircraft), CBO used Air Force officials' public statements and DoD documents to project when the replacement aircraft would arrive and what it would cost.[3] In effect, CBO deduced what a SAR might say for those programs.

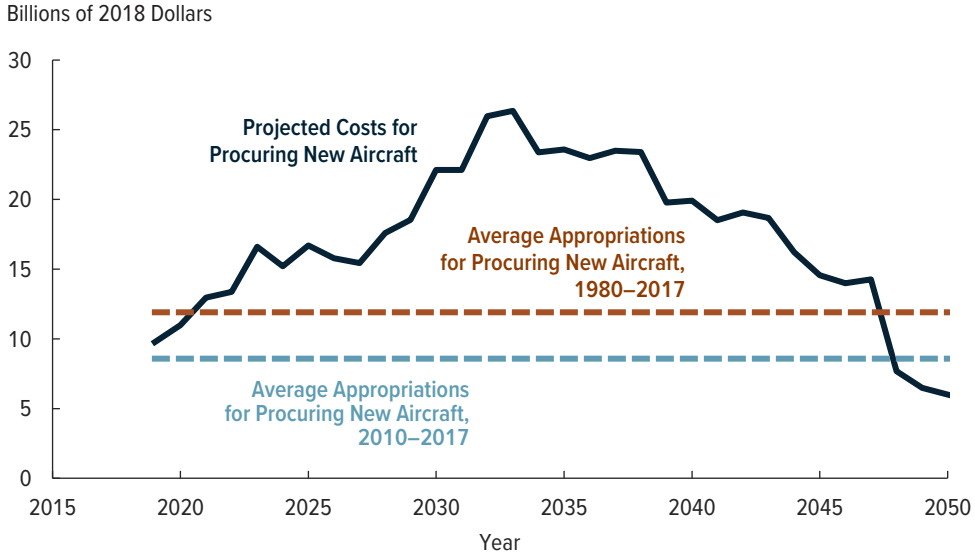
Third, for systems without SARs or any other publicly articulated plans, CBO projected that aircraft would be retired and replaced when they reach specified ages (see the appendix). CBO also estimated a per-aircraft replacement cost for each of those aircraft. At the

2. CBO's estimate does not consider the Air Force's recent proposal to increase the number of its operational squadrons to 386. See U.S. Air Force, "The Air Force We Need: 386 Operational Squadrons" (September 17, 2018), https://go.usa.gov/xPtm4.

3. See, for instance, Deputy Secretary of Defense, Annual Aviation Inventory and Funding Plan, Fiscal Years (FY) 2019–2048 (March 2018).

Figure 3.

Projected Air Force Costs for Procuring New Aircraft, 2019–2050



CBO projects increasing costs in the 2020s as the F-35A and B-21 fleets are built up. Costs increase further still in the 2030s as procurement of PCA aircraft commences.

Source: Congressional Budget Office.

PCA = Penetrating Counter Air.

beginning of fiscal year 2018, for example, the Air Force's 222 C-17 cargo aircraft ranged in age from 5 to 26. If they are retired at age 45, C-17 replacement aircraft would be needed from 2037 through 2058.[4] CBO estimated that a C-17 replacement would have a unit cost of $200 million. The Air Force would need to start receiving procurement appropriations for C-17 replacements two years earlier, in 2035. CBO's projection incorporates an assumption that each aircraft without a clearly articulated replacement would be replaced by a new aircraft broadly similar in capabilities and quantities. In other words, a "C-17 replacement aircraft" would replace the existing C-17.

To project the cost of replacing the Air Force's existing fleet over time, CBO estimated the replacement cost by age cohort. To make that estimate, CBO multiplied the per-aircraft replacement cost by the number of aircraft in that fleet (see Table A-1 and Table A-3 in the appendix). For example, the F-35A is intended to replace the A-10 attack aircraft and F-16C/D fighter aircraft, so CBO assigned each A-10 and F-16C/D a replacement cost of $94 million, CBO's estimate of the average procurement unit cost of an F-35A.[5] The F-16C/D, F-15C/D, KC-135, F-22, C-17, C-130, B-52, and B-1B fleets had the highest total replacement costs.

Projected Costs of New Fighter Aircraft

Funding for new fighter aircraft makes up about half of the total projected costs of procuring new aircraft. The two most costly programs in the projection, the F-35A and the PCA aircraft, are fighter aircraft.

Currently, about 85 percent of the Air Force's approximately 2,000 fighters are A-10s, F-15C/Ds, F-15Es, and F-16C/Ds, originally designed in the 1970s and purchased through the mid-1990s.[6] The other 15 percent

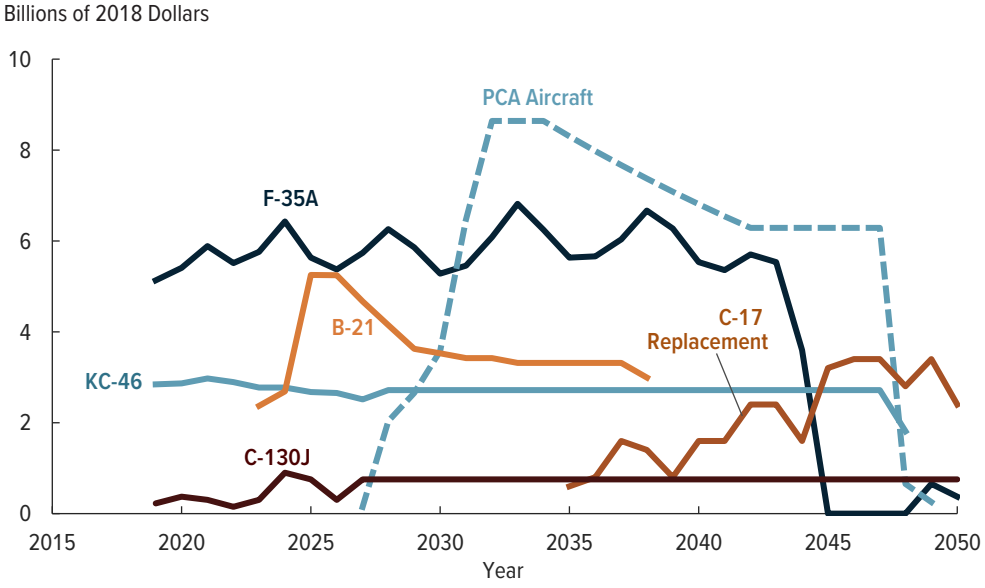
4. The C-141, the C-17's predecessor cargo aircraft, was retired at an average age of 35. The Air Force has generally been increasing the life span of its aircraft, however, so CBO assumed that the C-17 would be retired at age 45.

5. This technique does not imply that an aging A-10 aircraft is worth $94 million today. Rather, its planned replacement (the F-35A) would have an average procurement unit cost of that amount. Average procurement unit cost is total program procurement cost divided by the number of units procured. See Defense Acquisition University, "Average Procurement Unit Cost," www.dau.mil/glossary/pages/1471.aspx.

6. CBO treats the F-15E and the F-15C/D variants as different fleets. The F-15C/D was designed to engage in air-to-air combat, but the F-15E also has air-to-ground capability and can destroy enemy ground positions. See U.S. Air Force, "F-15E Strike Eagle" (April 2005), https://go.usa.gov/xPnC2.

Figure 4.

Projected Costs for Procuring the Most Expensive New Aircraft, 2019–2050



In CBO's projections, F-35A, KC-46, and C-130J procurement occurs during most of the projection period. B-21 procurement commences in the mid-2020s and runs through the late 2030s. Procurement of a C-17 replacement commences in the mid-2030s.

Source: Congressional Budget Office.

PCA = Penetrating Counter Air.

are newer F-22s and F-35As. Each model contributes unique capabilities to the overall force, such as the ability to fight other aircraft, attack targets on the ground, and operate in defended airspace (see Table 1).

CBO's projection includes the following aircraft:

- Continuing purchases of F-35As, with production reaching 60 aircraft per year in 2024 and then continuing through 2044 for a total of 1,763 aircraft, as specified in the December 2017 SAR for the F-35s;
- Purchasing a Light Attack Aircraft (LAA) to support ground forces in circumstances where air defenses are not a major concern; and
- Developing a new PCA aircraft to be fielded in the early 2030s with the mission of maintaining air superiority against future threats.

Under CBO's projection, the types of fighter and attack aircraft operated by the Air Force would decrease from six (A-10, F-15C/D, F-15E, F-16C/D, F-22, and F-35A) to three (F-35A, LAA, and PCA aircraft).

F-35A

Procurement of the F-35A would continue through 2044. The F-35A's average procurement unit cost is estimated at $94 million (in 2018 dollars). F-35As are multirole fighters that can fulfill both ground attack and air-superiority missions.

Light Attack Aircraft

The Air Force is still deciding how it will replace the A-10's ability to support ground forces as that aircraft is retired. Originally, it planned to fulfill that mission with the F-35A, but concerns that the F-35A flies too fast for the mission have led the Air Force to consider other approaches. One alternative is the LAA, perhaps based on a ground attack aircraft already in production for an allied nation.

In CBO's projection, the Air Force would procure 100 LAAs in the early 2020s—an estimate that CBO based on statements by the Secretary of the Air Force that the service has allocated $2.4 billion for such an aircraft from 2020 through 2023.[7] Given the cost

7. See Amy McCullough, "USAF's Five-Year Plan Includes $2.4 Billion to Procure Light Attack Aircraft," *Air Force Magazine* (February 16, 2018), http://tinyurl.com/ydxuzhdg.

Table 1.

Capabilities of Current and Possible Future Air Force Fighter Aircraft

Aircraft	Currently Operated by the Air Force	Air-to-Air Capability	Air-to-Ground Capability	Stealthy
A-10	Yes	Partial	Yes	No
F-15C/D	Yes	Yes	No	No
F-15E	Yes	Yes	Yes	No
F-16C/D	Yes	Yes	Yes	No
F-22	Yes	Yes	Partial	Yes
F-35A	Yes	Yes	Yes	Yes
Light Attack	Proposed	No	Yes	No
Penetrating Counter Air	Notional	Yes	No	Yes

Source: Congressional Budget Office.

of possible candidate aircraft, CBO concluded that $24 million is a plausible procurement unit cost for the LAA.

Although the Air Force is studying light attack aircraft for use in lightly defended airspace, it has not identified how many it might purchase, nor does it yet have an official goal to purchase such aircraft. The Air Force could end up buying a few hundred LAAs (a quantity similar to the approximately 300 A-10s it operates today), or it could decide that LAAs do not meet its needs and end up not procuring any of those aircraft. Because the procurement cost of an LAA would be comparatively modest and the fleet sizes being considered are relatively small, whatever approach the Air Force selects will not have a large impact on the total costs of procuring new aircraft.

Penetrating Counter Air Aircraft

The PCA aircraft is one component of the Air Force's Next Generation Air Dominance effort to develop systems that will eventually fill the air-superiority role that the F-15C/D and F-22 occupy today. The Air Force has not determined the characteristics of the PCA aircraft, but the *Air Force Air Superiority 2030 Flight Plan* indicated the need for a highly advanced air-superiority aircraft to be fielded in the early to mid-2030s.[8] CBO's projection includes purchases of 414 PCA aircraft with an average procurement cost of about $300 million each. Procurement appropriations would begin in 2028, and the first PCA aircraft would enter service in 2030. (In light of the long development times associated with F-22s and F-35s, however, that projection of the PCA aircraft's delivery schedule may be optimistic.) CBO projects that, by 2050, the PCA aircraft would replace the roughly 400 F-15C/Ds and F-22s that the Air Force operates today.

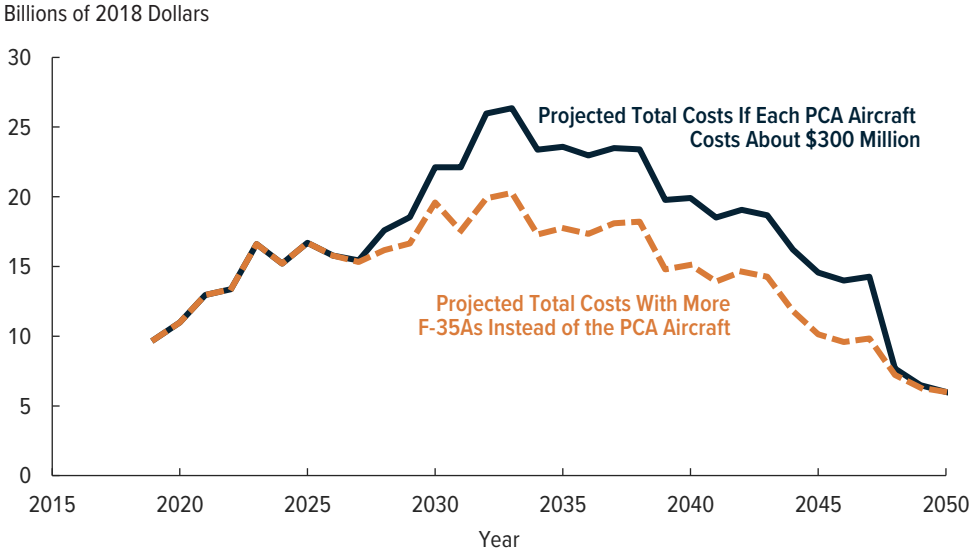
CBO's projected procurement unit cost for the PCA aircraft is based on two factors. First, the PCA aircraft would probably have a greater range and payload, as well as improved stealth and sensor capabilities, than today's F-22; those characteristics would help it operate in the presence of the high-end air defenses that DoD believes China, Russia, and other potential adversaries may have in the future. (Stealth capabilities reduce the chance of detection by radar and infrared sensors.) Second, other stealthy aircraft, such as the B-2 bomber and the F-22 and F-35A fighters, have experienced cost increases that resulted in lower production rates and decreased total purchases. Containing costs for the PCA aircraft may be similarly difficult.

The PCA aircraft's procurement unit cost is the most important parameter in CBO's projection. Because of the high cost and uncertainty about the aircraft's characteristics, reasonable changes in assumptions about the PCA aircraft could have a sizable impact on CBO's projections of total Air Force costs. For example, the Air Force could decide that the PCA aircraft's cutting-edge design is unaffordable and instead opt to purchase more F-35As. Because the F-35A's estimated average procurement unit cost is $94 million, compared with about $300 million for the PCA aircraft, the peak for new aircraft procurement in 2033 without the PCA aircraft would be $20 billion rather than $26 billion (see Figure 5). Another option the Air Force could pursue is a hybrid aircraft that combines the high-performance airframe of the F-22 with the more modern electronics systems of

8. See U.S. Air Force, "AF Releases Air Superiority 2030 Flight Plan" (May 31, 2016), https://go.usa.gov/xPnCn; and John A. Tirpak, "Saving Air Superiority," *Air Force Magazine* (April 2017), http://tinyurl.com/yaxw8n9p.

Figure 5.

Possible Savings If the Air Force Purchases More F-35As Instead of the PCA Aircraft, 2019–2050



Procuring more F-35As instead of the PCA aircraft would substantially reduce the projected costs starting a decade from now. CBO estimates that the PCA aircraft would cost about $300 million each (in 2018 dollars), whereas F-35As cost $94 million each.

Source: Congressional Budget Office.

PCA = Penetrating Counter Air.

the F-35A.[9] That approach, which Lockheed Martin has proposed for Japan, would probably cost less than CBO's PCA aircraft estimate but more than the F-35A option. Finally, the Air Force could develop a means of achieving air superiority that does not involve a new advanced fighter aircraft. It recently did that with its decision not to replace its E-8 Joint STARS (Surveillance Target Attack Radar System) aircraft but to replace the capability the E-8 provides with a network of new and existing sensors linked by a ground-based battle management system.

Managing Procurement Costs in Peak Years

The Air Force could adopt a variety of approaches to reduce the annual costs of procuring new aircraft. For example, it could delay the purchase of one or more types of modern aircraft and fill the gap by extending the service life of the aircraft that the new system would have replaced. Extending service life can be expensive, but it is usually less costly than buying a new, more capable aircraft. That approach has limitations, however: Obtaining replacement parts can be both difficult and expensive, and a refurbished fleet may not provide as many available and mission-capable aircraft as a new fleet of the same size.

The Air Force is exploring several measures that would extend the service life of its A-10s, F-15C/Ds, F-15Es, and F-16C/Ds, but whether it will implement any of those contemplated service life extensions (and in what quantities) remains undetermined. In CBO's projection, the 1980s-vintage fighter aircraft in today's force would all be retired by the early to mid-2040s. Some service life extensions would be needed to keep the last of those aircraft operating until the end of that period. Which types of aircraft the Air Force would choose to extend is uncertain; the A-10, F-15C/D, F-15E, and F-16C/D each have their proponents. CBO's projection of the costs of procuring new aircraft does not include the costs of service life extensions.

Other approaches are possible. Although the Air Force has no plans to purchase new F-15s or F-16s, both remain in production for sales to foreign militaries.[10] Buying new versions of F-15s or F-16s would probably be more expensive than extending the service life of

9. Although not considered in this report, costs for research and development of such a hybrid would probably be lower than for an entirely new design like the PCA aircraft.

10. For possible Air Force purchases of new versions of older aircraft designs, see, for example, Congressional Budget Office, *Options for Reducing the Deficit: 2017 to 2026* (December 2016), pp. 77–78, www.cbo.gov/publication/52142, and *Alternatives for Modernizing U.S. Fighter Forces* (May 2009), www.cbo.gov/publication/41181 (PDF, 1.8 MB).

existing aircraft but less costly than buying and operating a new, modern aircraft. New versions of older-model aircraft would probably result in more aircraft that are available (not in depot-level maintenance) and mission capable than a similarly sized fleet of refurbished aircraft. Alternatively, the Air Force could delay a new system and let the size of a fleet shrink as older aircraft retire, creating a smaller fleet in the interim.

The Air Force could smooth its procurement appropriations by accelerating the purchase of one or more types of aircraft. Or it could replace retiring aircraft with fewer modern aircraft and evolve to a smaller overall fleet, an approach the Air Force has adopted for many years. Or it could replace retiring aircraft with a mix of new, modern aircraft and new versions of the older-model aircraft. Maintaining two different types of aircraft would be more costly than maintaining a single fleet, however, because the Air Force would need to keep two different maintenance operations in place.

Appendix: Composition of the Current Air Force Fleet and CBO's Estimate of Replacement Costs

The three tables in this appendix describe the current Air Force fleet and the assumptions that the Congressional Budget Office used to project the costs of procuring new aircraft.

Table A-1 shows the number of aircraft by category and by type of aircraft within each category, as well as information about the age of the fleet. In aggregate, the aircraft range in age from just-delivered to 60 years old, though only a few types of aircraft, most notably the C-130s, have wide age ranges individually. Detailed descriptions of selected aircraft, provided by the Air Force, appear in Table A-2.

Table A-3 shows each aircraft's estimated replacement cost and retirement schedule, which CBO used to estimate the costs of procuring new aircraft. A fleet's estimated total replacement cost would be its fleet size from Table A-1 multiplied by its estimated replacement unit cost from Table A-3. Individually, most of the estimates in the table do not have a large effect on the total projected costs for procuring new aircraft (see Figure 3 on page 6). The price of the Penetrating Counter Air aircraft, which is based on the replacement unit cost of the F-15C/D and F-22 aircraft, is the most important parameter in the projection (see Figure 5 on page 9).

Table A-1.

Number and Age of Air Force Aircraft, by Category, as of October 1, 2017

Category	Aircraft	Number	Age of Newest Aircraft	Average Age	Age of Oldest Aircraft
Fighter and Attack		**2,022**	**1**	**26.4**	**39**
	A-10	307	34	36.8	39
	F-15C/D	237	28	33.9	39
	F-15E	218	14	26.0	31
	F-16C/D	956	13	27.4	33
	F-22	184	6	10.4	16
	F-35A	120	1	3.2	7
Bomber		**157**	**20**	**42.0**	**58**
	B-1B	62	30	30.6	32
	B-2	20	20	23.7	29
	B-52	75	55	56.4	58
Airlift		**1,085**	**1**	**24.7**	**55**
	C-5	65	29	36.5	48
	C-12	70	5	20.7	42
	C-17	222	5	14.5	26
	C-21	31	31	33.1	34
	C-32	6	14	17.8	20
	C-37	12	7	15.0	19
	C-40	11	6	12.7	16
	C-130	579	1	24.6	55
	TH-1	28	42	44.1	46
	UH-1	59	47	47.1	48
	VC-25	2	27	27.5	28
Tanker		**457**	**28**	**53.7**	**60**
	KC-10	59	28	33.3	37
	KC-135	398	53	56.7	60

Continued

Table A-1. Continued

Number and Age of Air Force Aircraft, by Category, as of October 1, 2017

Category	Aircraft	Number	Age of Newest Aircraft	Average Age	Age of Oldest Aircraft
Reconnaissance		**523**	**1**	**14.0**	**56**
	E-3	31	34	38.6	42
	E-4	4	43	44.0	45
	E-8	17	13	17.9	27
	E-9	2	25	25.0	25
	E-11	4	6	6.3	7
	MQ-1 Predator	122	7	10.8	19
	MQ-9 Reaper	243	1	5.0	16
	OC/RC/TC/WC-135	27	53	54.7	56
	RC-26	11	23	23.9	26
	RQ-4 Global Hawk	31	4	6.9	11
	U-2	31	29	35.0	50
Trainer		**1,194**	**6**	**30.3**	**57**
	T-1	178	20	23.4	26
	T-6	444	8	12.5	19
	T-38	505	46	50.8	57
	T-41	4	48	48.5	50
	T-51	3	13	13.0	13
	T-53	24	6	6.1	7
	TG-10	5	15	15.8	16
	TG-14	4	15	15.3	16
	TG-15	5	14	14.0	14
	TG-16	19	6	6.4	7
	UV-18	3	36	39.3	41
Other		**149**	**1**	**19.9**	**35**
	HH-60	99	6	26.9	35
	MV-22	50	1	6.1	13
Entire Fleet		**5,587**	**1**	**28.3**	**60**

Source: Congressional Budget Office, using data from the U.S. Air Force.

Table A-2.

Descriptions of Selected Air Force Aircraft

Category	Aircraft	Manufacturer	Primary Function(s)	Engine(s)	Wingspan[a] (Feet)	Length[a] (Feet)	Height[a] (Feet)	Maximum Takeoff Weight (Pounds)	Maximum Speed (Miles per hour)
Fighter and Attack									
	A-10	Fairchild Republic	Close air support	2 turbofans	58	53	15	51,000	450
	F-15C/D	McDonnell Douglas (now Boeing)	Air superiority	2 turbofans with afterburners	43	64	19	68,000	1,875
	F-15E	McDonnell Douglas (now Boeing)	Ground attack	2 turbofans with afterburners	43	64	19	81,000	1,875
	F-16C/D	General Dynamics (now Lockheed Martin)	Multirole: ground attack, air superiority	1 turbofan with afterburner	33	49	16	37,500	1,500
	F-22	Lockheed Martin	Air superiority, ground attack	2 turbofans with afterburners	45	62	17	83,500	1,500
	F-35A	Lockheed Martin	Multirole: ground attack, air superiority	1 turbofan	35	51	14	70,000	1,200
Bomber									
	B-1B	Rockwell (now Boeing)	Long-range ground attack	4 turbofans with afterburners	137	146	34	477,000	900
	B-2	Northrop Grumman	Long-range ground attack	4 turbofans	172	69	17	336,500	650
	B-52	Boeing	Long-range ground attack	8 turbofans	185	159	41	488,000	650
Airlift									
	C-5	Lockheed Martin	Long-range transport	4 turbofans	223	248	65	840,000	518
	C-17	Boeing	Long-range transport	4 turbofans	170	174	55	585,000	518
	C-21	Learjet	Passenger and cargo transport	2 turbofans	40	49	12	18,300	530
	C-130	Lockheed Martin	Medium-range transport	4 turboprops	133	98	39	164,000	417
	UH-1	Bell Helicopter	Utility transport (helicopter)	2 turboshafts	n.a.	57	13	10,500	149
	VC-25	Boeing	Presidential transport (Air Force One)	4 turbofans	196	232	63	833,000	630

Continued

Table A-2. Continued

Descriptions of Selected Air Force Aircraft

Category	Aircraft	Manufacturer	Primary Function(s)	Engine(s)	Wingspan[a] (Feet)	Length[a] (Feet)	Height[a] (Feet)	Maximum Takeoff Weight (Pounds)	Maximum Speed (Miles per hour)
Tanker									
	KC-10	Boeing	Aerial refueling and long-range transport	3 turbofans	165	182	58	590,000	619
	KC-135	Boeing	Aerial refueling and long-range transport	4 turbofans	131	136	42	322,500	530
Reconnaissance									
	MQ-9 Reaper	General Atomics	Remotely piloted reconnaissance and ground attack	1 turboprop	66	36	13	10,500	230
	OC/RC/TC/WC-135	Boeing	Reconnaissance	4 turbofans	131	135	42	297,000	500
	RQ-4 Global Hawk	Northrop Grumman	Remotely piloted high-altitude reconnaissance	1 turbofan	131	48	15	32,250	357
	U-2	Lockheed Martin	High-altitude reconnaissance	1 turbofan	105	63	16	40,000	410
Trainer									
	T-1	Raytheon	Advanced training for airlift and tanker pilots	2 turbofans	44	48	14	16,100	538
	T-6	Raytheon	Entry-level pilot training	1 turboprop	34	33	11	6,500	320
	T-38	Northrop	Advanced pilot training	2 turbojets with afterburners	25	46	13	12,090	812
Other									
	HH-60	United Technologies/ Sikorsky	Combat search and rescue (helicopter)	2 turboshafts	n.a.	65	17	22,000	184
	MV-22	Bell/Boeing	Special Operations Forces (tiltrotor)	2 turboshafts	85	57	22	52,870 vertical; 60,500 rolling	277

Source: Congressional Budget Office, using data from the U.S. Air Force (www.af.mil/About-Us/Fact-Sheets).

n.a. = not applicable.

a. Wingspan, length, and height are rounded to the nearest foot.

Table A-3.

CBO's Estimates of Replacement Unit Costs and Retirement Ages for Each Aircraft Type

Category	Aircraft	Replacement Unit Cost (Millions of 2018 dollars)	Will Retire ...
Fighter and Attack			
	A-10	94	As F-35As arrive
	F-15C/D	317	As PCA aircraft arrive, starting in 2030
	F-15E	94	As F-35As arrive
	F-16C/D	94	As F-35As arrive
	F-22	317	As PCA aircraft arrive, starting in 2030
	F-35A	94	At age 40, starting in 2051
Bomber			
	B-1B	580	As B-21s arrive, starting in 2028
	B-2	580	As B-21s arrive (after B-1Bs are replaced), starting in 2037
	B-52	580	At age 95, starting in 2055
Airlift			
	C-5	200	At age 70, starting in 2040
	C-12	17	At age 45, starting in 2021
	C-17	200	At age 45, starting in 2037
	C-21	5	At age 45, starting in 2029
	C-32	80	At age 30, starting in 2028
	C-37	50	At age 45, starting in 2044
	C-40	90	At age 45, starting in 2047
	C-130	75	As C-130Js arrive
	TH-1	10	At age 50, starting in 2022
	UH-1	25	When replaced by MH-139 helicopters, starting in 2022
	VC-25	1,950	When replaced by VC-25B, in 2024 and 2025
Tanker			
	KC-10	181	As KC-46s arrive
	KC-135	181	As KC-46s arrive

Continued

Table A-3. Continued

CBO's Estimates of Replacement Unit Costs and Retirement Ages for Each Aircraft Type

Category	Aircraft	Replacement Unit Cost (Millions of 2018 dollars)	Will Retire ...
Reconnaissance			
	E-3	300	At age 55, starting in 2031
	E-4	275	At age 50, starting in 2023
	E-8	n.a.	In 2019 and 2020; no replacement aircraft
	E-9	25	At age 45, starting in 2038
	E-11	50	At age 45, starting in 2056
	MQ-1 Predator	n.a.	[Retired in 2018]
	MQ-9 Reaper	27	At age 20, starting in 2022
	OC/RC/TC/WC-135	200	At age 70, starting in 2032
	RC-26	10	At age 30, starting in 2022
	RQ-4 Global Hawk	80	At age 20, starting in 2027
	U-2	100	At age 50, starting in 2018
Trainer			
	T-1	10	At age 60, starting in 2052
	T-6	7	At age 40, starting in 2039
	T-38	16	As T-Xs arrive, starting in 2023
	T-41	2	At age 60, starting in 2028
	T-51	2	At age 60, starting in 2065
	T-53	1	At age 60, starting in 2071
	TG-10	0.2	At age 20, starting in 2022
	TG-14	0.2	At age 20, starting in 2022
	TG-15	0.2	At age 20, starting in 2024
	TG-16	0.3	At age 20, starting in 2031
	UV-18	10	At age 45, starting in 2022
Other			
	HH-60	63	As CRHs arrive, starting in 2021
	MV-22	100	At age 40, starting in 2045

Source: Congressional Budget Office.

CBO assumed that funding for an aircraft must be appropriated two years before the aircraft arrives.

CRH = Combat Rescue Helicopter; PCA = Penetrating Counter Air; n.a. = not applicable.

List of Tables and Figures

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About This Document

This Congressional Budget Office report was prepared at the request of the Chairman and Ranking Member of the Senate Budget Committee. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

Edward G. Keating, David Arthur, and Adebayo Adedeji prepared the report with guidance from David Mosher. Ron Gecan provided helpful comments, as did J.J. Gertler of the Congressional Research Service and Jack Graser of the RAND Corporation. (The assistance of external reviewers implies no responsibility for the final product, which rests solely with CBO.) Thomas Keller assisted with the analysis presented in this report. Bernard Kempinski (formerly of CBO) created the artwork shown in Box 1. Eric J. Labs fact-checked the report.

Jeffrey Kling, John Skeen, and Robert Sunshine reviewed this report. Rebecca Lanning edited it, and Jorge Salazar prepared it for publication. An electronic version is available on CBO's website (www.cbo.gov/publication/54657).

CBO continually seeks feedback to make its work as useful as possible. Please send any feedback to communications@cbo.gov.

Keith Hall
Director
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