



**Congressional  
Research Service**

Informing the legislative debate since 1914

---

# The Air Force Aviation Investment Challenge

**(name redacted)**

Specialist in Military Aviation

December 17, 2015

**Congressional Research Service**

7-....

[www.crs.gov](http://www.crs.gov)

R44305

## Summary

The U.S. Air Force is in the midst of an ambitious aviation modernization program, driven primarily by the age of its current aircraft fleets. Four major programs are in procurement, with five more in research and development (R&D).

The need to replace several types of aircraft simultaneously poses challenges to future budgets, as the new programs compete with existing program commitments and normal program growth under a restricted service topline. The impending expiration of caps imposed by the Balanced Budget Act coincides with when modernization programs can be expected to experience the most growth, but does not necessarily offer sufficient relief to avoid program cuts or other funding approaches.

To meet its modernization requirements, the Air Force may need to revise that topline, defer or delay other programs (including possibly reducing the quantity of aircraft already in procurement), or find other sources of funding to carry all its plans to fruition. Some specific options may include (but are not limited to)

- raising the Air Force topline (and/or the aviation modernization share);
- pusharounds or reductions in Air Force programs and activities other than modernization;
- reducing annual quantities of the F-35A;
- further retarding the growth of R&D programs;
- deferring the KC-Y follow-on tanker;
- funding the long-range strike bomber through a non-Air Force budget.

The report examines these options in further detail.

## Contents

|   |   |
|---|---|
| The Budget Challenge .....  | 2 |
| Why Doesn't It Look Like a Bow Wave?.....                         | 3 |
| What Changes Are Coming? .....                                    | 4 |
| What Options Might Reduce the Impact of the Bow Wave?.....        | 5 |
| Raise the Topline (and/or the Aviation Modernization Share) ..... | 5 |
| Reduce and/or Defer Spending .....                                | 5 |
| Pusharounds/Reductions in Other Programs and Activities.....      | 5 |
| Reduce F-35A Annual Quantities .....                              | 6 |
| Retard Program Growth Further .....                               | 6 |
| Defer KC-Y.....   | 6 |
| Fund LRS-B Through a Non-Air Force Budget .....                   | 6 |
| A Concluding Observation and Potential Issue for Congress.....    | 7 |

## Figures

|   |   |
|---|---|
| Figure 1. Air Force Modernization Programs.....         | 2 |
| Figure 2. "Newer" Air Force Aviation R&D Programs ..... | 3 |

## Contacts

|                                  |   |
|----------------------------------|---|
| Author Contact Information ..... | 7 |
| Acknowledgments .....            | 7 |

*We must modernize the Air Force. This isn't optional. We must do it. And it will be painful because we will have to make hard choices.—General Mark Welsh, Chief of Staff, U.S. Air Force*<sup>1</sup>

*We can't – particularly with \$17 billion less in 2017 – we're not going to be able to do it all.—Deborah Lee James, Secretary of the Air Force*<sup>2</sup>

The U.S. Air Force is in the midst of an ambitious modernization program, driven primarily by the age of its current aircraft fleets. It has undertaken three major programs, repeatedly declared to be the service's top procurement priorities:

- the F-35A strike fighter, to replace several aircraft types whose designs date from the 1970s;<sup>3</sup>
- the KC-46A tanker, to replace KC-135s designed in the 1950s;<sup>4</sup>
- the Long-Range Strike Bomber (LRS-B), initially to replace B-52s and B-1s, whose designs date from the 1950s and 1970s, respectively.<sup>5</sup>

In addition, the Air Force continues to procure variants of the C-130 cargo aircraft and a relatively small number of remotely piloted aircraft systems (RPA, as the Air Force refers to unmanned aerial systems).<sup>6</sup>

Together, these five programs account for \$67.2 billion over the FY2016-2020 Future Years Defense Program (FYDP). In FY2016, the four procurement programs (F-35A, KC-46, C-130, and RPA) account for 99% of the Air Force's aircraft acquisition budget; LRS-B is 5% of the Air Force overall research and development (R&D) budget, but 60% of the budget for Advanced Component Development & Prototypes.<sup>7</sup>

Those are not the Air Force's only modernization requirements. The FY2016-2020 FYDP also includes initial funding for

- JSTARS recapitalization, to develop a successor for the E-8 intelligence, surveillance, and reconnaissance aircraft, with a projected entry into service of FY2022;<sup>8</sup>
- a new combat rescue helicopter (CRH) to retrieve downed airmen and other personnel, to succeed the HH-60G;
- a Presidential Aircraft Replacement (PAR) program to develop and acquire a replacement for two VC-25 aircraft popularly referred to as Air Force One; and
- a new advanced trainer aircraft, called the T-X, to replace T-38 trainers designed in the 1950s.

---

<sup>1</sup> Colin Clark, "Air Force Chief Welsh Signals Shift To Modernization, AKA Weapons," *Breaking Defense*, February 12, 2015.

<sup>2</sup> Jen DiMascio, "AF Secretary Considering Cuts To Joint Strike Fighter," *Aerospace Daily*, December 3, 2015.

<sup>3</sup> For more information, see CRS Report RL30563, *F-35 Joint Strike Fighter (JSF) Program*.

<sup>4</sup> For more information, see CRS Report RL34398, *Air Force KC-46A Tanker Aircraft Program*.

<sup>5</sup> For more information, see CRS Report R43049, *U.S. Air Force Bomber Sustainment and Modernization: Background and Issues for Congress*, and CRS Insight IN10384, *Air Force Bomber Contract Awarded*.

<sup>6</sup> For more information, see CRS Report R42136, *U.S. Unmanned Aerial Systems*.

<sup>7</sup> Procurement percentage excludes modification funding.

<sup>8</sup> IOC from Department of Defense, *Annual Aviation Inventory and Funding Plan, Fiscal Years (FY) 2016-2045*, Washington, DC, April 22, 2015.

Perhaps notably, no funded plan exists for recapitalizing the E-3 AWACS fleet, based on the same airframe as the KC-135 and E-8. The current plan also includes no funding for the long-expected CVLSP helicopter replacement program. Any such programs would add to the outyear funding issue discussed below.

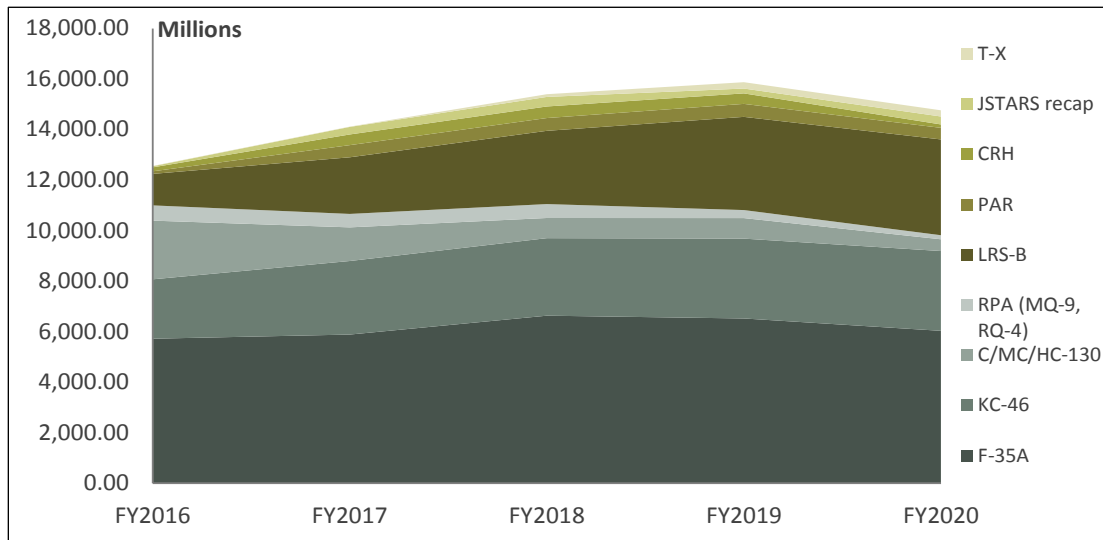
## The Budget Challenge

The total investment required for these nine programs, combined with the budgetary restrictions in place as a consequence of the Balanced Budget Act of 2013 (P.L. 113-67), or BBA, poses a significant challenge to Air Force budgeters. Because defense budget exhibits project only five years into the future, however, that challenge may not be immediately evident. A more detailed explanation follows.

As **Figure 1** shows, projected program spending for F-35A and KC-46 procurement is substantial and steady, while RPAs add a relatively small share and spending on the C-130 declines over time. (As this report went to press, the Air Force announced a plan to acquire 75 more MQ-9 Reaper RPAs; the cost of that acquisition is not reflected in these figures.)

The major R&D programs offer a different picture. Spending for the LRS-B, following its recent contract award and entering its engineering and manufacturing development phase, is projected to triple over the course of the FYDP.<sup>9</sup> The newer programs begin with relatively low spending in the current FYDP; the challenge will come if those programs proceed to advanced development and eventually procurement. With F-35A and KC-46 slated to continue for many years (and, in KC-46’s case, a successor KC-Y programmed to immediately follow), procurement spending on established programs will continue to be substantial. How will the future Air Force procurement budget accommodate the new programs as well?

**Figure 1. Air Force Modernization Programs**  
FY2016-2020



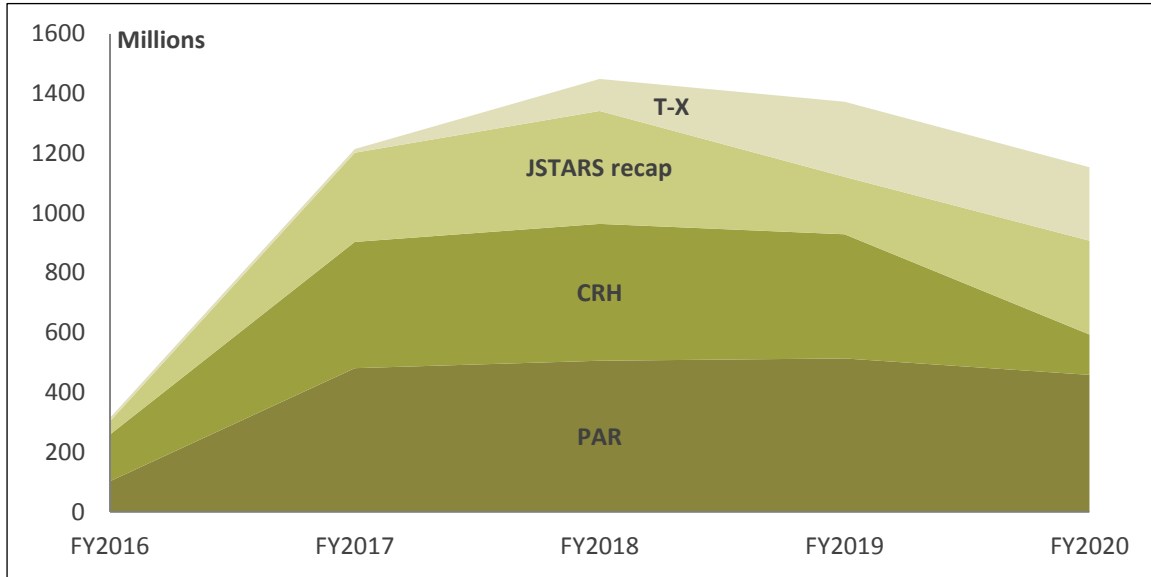
**Source:** Air Force budget submission for FY2016.

**Note:** Procurement programs shown in greys; R&D in green/brown.

<sup>9</sup> See CRS Insight IN10095, *Budget Highlight: Air Force Long Range Strike Bomber*.

LRS-B complicates the picture further. It is funded (at least through the current FYDP) in the R&D budget, where both the program’s size and its increasing budget requirements will place pressure on the newer programs. At some point, LRS-B may shift from R&D to the procurement budget, but that appears to be somewhere beyond FY2020 at the earliest—which is when CRH, PAR, T-X, and JSTARS Recap might also be expected to move from R&D to procurement, exacerbating the rivalry for resources.

**Figure 2. “Newer” Air Force Aviation R&D Programs**  
FY2016-2020; excludes LRS-B



**Source:** Air Force budget submission for FY2016.

The net effect of starting these new programs atop a full procurement budget is a classic “bow wave” of procurement, with increasing numbers of programs with growing budgets all trying to fit within a fixed budget topline at the same time while building requirements for increased future funding.<sup>10</sup>

## Why Doesn’t It Look Like a Bow Wave?

One might expect the chart of a procurement “bow wave” to show expenses increasing in the outyears. **Figure 1** and **Figure 2** both show an increase in FY2018 and FY2019, then a drop for FY2020. Also, the increases for FY2018 and FY2019 do not appear very large in **Figure 1**. If an Air Force modernization bow wave exists, why doesn’t it show more vividly on the charts?

There are three reasons. Two are substantive; one is purely graphical.

First, because the FYDP includes only six years’ data (the year currently executed, the requested year, and the following four years),<sup>11</sup> the effects of the bow wave are difficult to portray, as the

<sup>10</sup> This is distinct from scheduling programs to minimize resource conflicts, but is in part necessary due to the block obsolescence of large fleets of aircraft.

<sup>11</sup> 31 U.S.C. §1105(a) requires the federal budget to show data for the request year and four following years. DOD adds data for the fiscal year currently being executed, so the FYDP shows six years of data, five of which are in the future.

highest development and procurement costs of the new starts and LRS-B would take place after FY2020. What is seen in **Figure 1** and **Figure 2** can be considered the seeds of the challenge, with the full effects coming in the years beyond the chart.

Second, the Air Force has been managing its current programs to remain under its topline budget cap. This has the effect of flattening all spending, as programs that might otherwise grow are constrained, extended, and/or delayed (“moved right,” in budget parlance) to keep the modernization accounts under their caps. It is not unreasonable to hypothesize that absent the caps, the program budgets might show greater growth.

The purely graphical reason that **Figure 1** appears to show virtually flat spending is that the sums for the current procurement programs (F-35A, KC-46, C-130, and RPA) are so large that even significant variations in the smaller programs are visually minimized. By omitting the larger established programs, **Figure 2** shows the shape of those newer programs more clearly.

It may be tempting to say that because the Air Force has been able to fit its current major procurement and R&D programs into its budget, there is no current modernization budget challenge. In response, one could note that some of those programs, like T-X and CRH, have been delayed from when they were initially required, leading to additional costs to keep the older aircraft that would otherwise have been replaced operating past their designed service lives. Those costs come from the operations and maintenance budgets, and are thus not reflected here, but keeping modernization programs under a current cap does result in costs elsewhere in the Air Force.

## What Changes Are Coming?

Perhaps the most significant potential change in the Air Force’s budgetary landscape is the end of the BBA-mandated budget caps in FY2021. The end of caps does not mean that the Air Force will get more money, but the R&D programs appear all to be timed such that the bulk of their funding requirements will come after the caps end. Whether this is a deliberate strategy on the part of the Air Force or a coincidence of timing is unclear, but it appears that the Air Force is gambling that the budget caps will not be extended or replaced.

Even with the current caps, normal program growth and program changes (like the eventual transfer of LRS-B and other R&D programs from the R&D budget to the procurement budget) will increase the competition for procurement dollars. The F-35A and KC-46 programs will continue for decades, offering little prospective relief. And until its possible transfer, the significant growth of LRS-B within the smaller R&D advanced development budget may seriously challenge the newer programs’ development schedules.

Also, as **Figure 1** and **Figure 2** show, current Air Force plans result in a surge in modernization spending in FY2018 and FY2019. Recently, the DOD Comptroller stated that “there’ll probably be some slowdowns in some modernization programs” in the FY2017 budget submission from their projected level to accommodate other Air Force priorities.<sup>12</sup> A reduction in FY2017 could make the significant increases planned for FY2018 and FY2019 harder to achieve.

---

<sup>12</sup> Colin Clark, “Air Force Modernization On The Table: CSAF Gen. Welsh,” *Breaking Defense*, December 1, 2015.

## What Options Might Reduce the Impact of the Bow Wave?

When trying to fit growing numbers of growing programs under a fixed budget topline, the broad mechanical choices seem simple: raise the topline or reduce the programs. However, the details matter, especially in how one reduces programs and which programs are reduced.

### Raise the Topline (and/or the Aviation Modernization Share)

As noted, the BBA-mandated caps on defense spending end in FY2021. However, increasing the Air Force modernization budget after the caps expire (and assuming they are not extended or replaced with a similar mechanism) likely requires a chain of events:

- that defense is then able to get a larger share of the federal budget, and/or
- that the Air Force is able to get a larger share of the defense budget, and
- that competing internal Air Force priorities allow the bulk of any increase to be allocated to aviation modernization. This is not a given, as other, non-aviation Air Force activities like modernization of strategic nuclear systems are expected to require increased funding at the same time.

### Reduce and/or Defer Spending

Different means of changing programs yield different effects. Canceling programs can lead to gaps in important capabilities. Delaying or deferring programs can cause cost growth, possible mismatches of capabilities to requirements, and/or loss of industrial base capacity.

One also has to guess correctly which programs to reduce as the program delayed or deferred today may be exactly the one needed sooner should requirements, scenarios, adversary capabilities, or other factors change in the future.

Noting that CRS does not endorse any particular option, some possible spending reductions or deferrals that Congress may consider include (but are not limited to) the following:

### Pusharounds/Reductions in Other Programs and Activities

Aviation modernization is just one part of the overall Air Force budget. Whether the Air Force ultimately receives an increased topline or not, it is possible to move funds from other programs and activities to fund modernization, as the service has already been doing. The different sources of funds impose various costs. For example, reducing operations and maintenance funding to fund modernization can reduce the current readiness of Air Force units. Retiring or reducing older fleets (as the Air Force has proposed to do with the A-10 attack aircraft) may lead to real or perceived capability gaps.<sup>13</sup> Deferring other major programs (like nuclear modernization) may also create real or perceived capability gaps.<sup>14</sup> Reducing personnel to fund modernization could challenge the Air Force's ability to carry out its full range of missions.

---

<sup>13</sup> See CRS Report R43843, *Proposed Retirement of A-10 Aircraft: Background in Brief*.

<sup>14</sup> See CRS Report RL33640, *U.S. Strategic Nuclear Forces: Background, Developments, and Issues*, by (name redacted)



## Reduce F-35A Annual Quantities

The F-35A represents 42% of the FYDP budget for these nine programs. The Air Force intends to acquire 60 F-35As per year. Some commentators have proposed reducing the annual buy to 48 per year, which would free up approximately \$1 billion per year for other priorities, either within the roughly \$15 billion modernization budget or elsewhere in the Air Force. Those figures do not take into account any costs that would be incurred for extending the life of aircraft the F-35A is intended to replace; capability gaps created through the delayed introduction of more modern aircraft; the increased cost of other F-35 models to other services and allies resulting from a reduced annual buy; and/or the resulting match between U.S. capabilities and adversary air and air defense systems.

## Retard Program Growth Further

As noted earlier, the Air Force has already deferred some new starts to keep its modernization programs within a constrained topline. Further delaying or restricting the growth of T-X, JSTARS Recap, CRH, and/or PAR could help synchronize outyear program growth so that they are not all peaking at the same time as LRS-B or each other. However, these programs exist because older platforms are becoming increasingly expensive to maintain and operate. Further deferring them would continue those costs while extending systems—often many decades old—with declining capability. This is even more relevant in the case of LRS-B, as the B-52s it is intended to replace are already programmed to remain in service longer than any operational combat aircraft in history. Slowing or deferring LRS-B could require prolonging the B-52 fleet's life into technically—and budgetarily—unknown territory.

## Defer KC-Y

The KC-46 program is expected to provide 179 new aerial refueling tankers over 15 years to replace roughly one-third of the KC-135 fleet. A successor program, called KC-Y, is intended to provide another 179, notionally as a continuation of KC-46. Depending on the success of KC-46, the condition of the remaining air tanker fleet, and the number of aircraft requiring refueling (which may be determined in part by which other options the Air Force may take), it may be possible to defer KC-Y for some years. However, doing so could create capability gaps, decrease industrial base capability, and increase the costs of eventual KC-Y aircraft. Also, as KC-Y procurement is not scheduled to begin until after FY2027, the KC-Y program may be starting well after the main effects of the bow wave are felt.

## Fund LRS-B Through a Non-Air Force Budget

As part of its markup of the Navy's proposed FY2015 budget, Congress created the National Sea-Based Deterrence Fund (NSBDF), a fund in the DOD budget that was to be separate from the Navy's regular shipbuilding account, to fund development of SSBN(X), the replacement of the *Ohio*-class ballistic missile submarine. This was based on two arguments: (1) that the strategic deterrence mission of the SSBN(X) was a national mission, not unique to the Navy, and (2) that funding the procurement of SSBN(X)s outside the Navy's shipbuilding budget would preserve Navy shipbuilding funds for other Navy shipbuilding programs. The same arguments could be applied to LRS-B.<sup>15</sup>

---

<sup>15</sup> For more information on the NSBDF, see CRS Report R41129, *Navy Ohio Replacement (SSBN[X]) Ballistic Missile Submarine Program: Background and Issues for Congress*, by (name redacted) .

## A Concluding Observation and Potential Issue for Congress

With new weapon system development in some cases taking several decades, illustrating the budget in five- or six-year slices makes visualizing future budgetary needs difficult. Congress has mandated that DOD provide 30-year plans for shipbuilding and aviation programs, but the differing levels of detail in those plans impair their utility in projecting phenomena like the Air Force outyear bow wave.<sup>16</sup> A revision in the FYDP from projecting 5 years in the future to 10 years—even if that implies some reduced-fidelity detail in the outyears—could more tangibly illustrate the resource decisions required today to avoid budgetary “train wrecks” in the future.

### Author Contact Information

(name redacted)  
Specialist in Military Aviation  
/redacted@crs.loc.gov 7-....

### Acknowledgments

The author thanks CRS colleague (name redacted) and aviation savant Richard Aboulafia, of the Teal Group, for their useful review and comments.

---

<sup>16</sup> In part due to the nature and timelines for the development and production of their respective materiel, the 30-year shipbuilding plan includes program-level detail; the 30-year aviation plan aggregates spending by types of aircraft. For a discussion of contrasts between the plans, see Mackenzie Eaglen, *Pentagon’s aviation plan headed for a dead stick landing*, American Enterprise Institute, <https://www.aei.org/publication/pentagon-aviation-report-dead-stick-landing/>.

# EveryCRSReport.com

The Congressional Research Service (CRS) is a federal legislative branch agency, housed inside the Library of Congress, charged with providing the United States Congress non-partisan advice on issues that may come before Congress.

EveryCRSReport.com republishes CRS reports that are available to all Congressional staff. The reports are not classified, and Members of Congress routinely make individual reports available to the public.

Prior to our republication, we redacted names, phone numbers and email addresses of analysts who produced the reports. We also added this page to the report. We have not intentionally made any other changes to any report published on EveryCRSReport.com.

CRS reports, as a work of the United States government, are not subject to copyright protection in the United States. Any CRS report may be reproduced and distributed in its entirety without permission from CRS. However, as a CRS report may include copyrighted images or material from a third party, you may need to obtain permission of the copyright holder if you wish to copy or otherwise use copyrighted material.

Information in a CRS report should not be relied upon for purposes other than public understanding of information that has been provided by CRS to members of Congress in connection with CRS' institutional role.

EveryCRSReport.com is not a government website and is not affiliated with CRS. We do not claim copyright on any CRS report we have republished.