U.S. Air Force

The U.S. Air Force (USAF) is the youngest of the U.S. military's four branches, having been born out of the Army Signal Corps to become its own service in 1947. The significant expansion of the USAF's mission over the years is reflected in the changes in its organizational structure. Initially, Air Force operations were divided among four major components—Strategic Air Command, Tactical Air Command, Air Defense Command, and Military Air Transport Service—that collectively reflected its "fly, fight, and win" nature. Space's rise to prominence began in the early 1950s, and with it came a host of faculties that would help to expand the service's impact and mission set.

Today, the Air Force focuses on five principal missions:

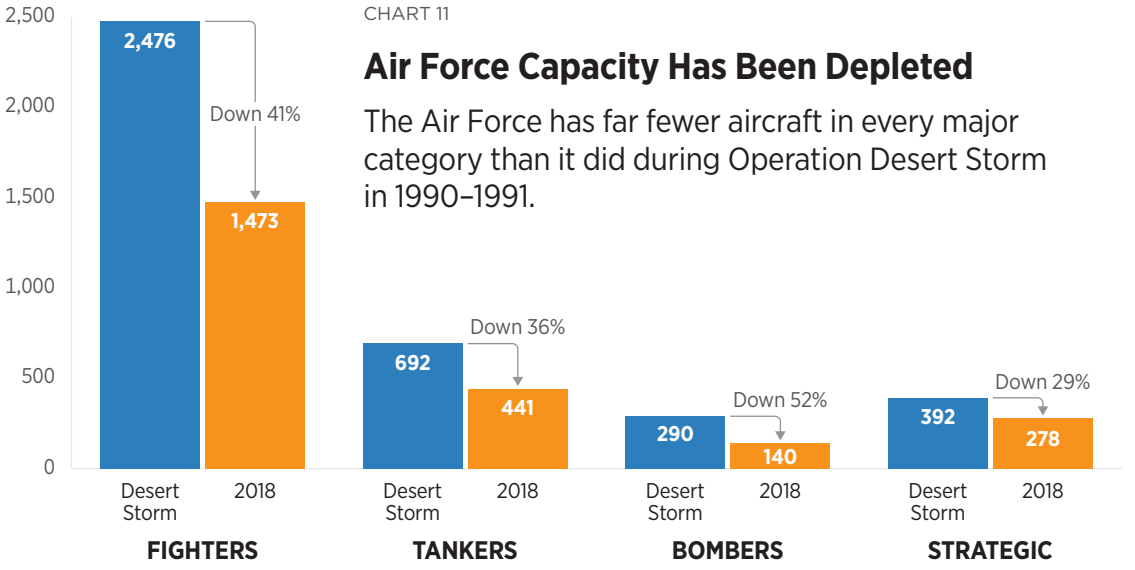
- Air and space superiority;
- Intelligence, surveillance, and reconnaissance (ISR);
- Mobility and lift;
- Global strike; and
- Command and control (C2).

These missions, while all necessary, put even greater demands on the resources available to the Air Force in an incredibly strained and competitive fiscal environment. Unlike some of the other services, the Air Force did not expand in numbers during the post-9/11 buildup. Instead, it grew smaller as acquisitions of new aircraft failed to offset programmed retirements of older aircraft. Following the sequestration debacle in 2012, the Air Force began to trade size for quality. Using the 2012 Defense Strategic Guidance (DSG) as its framework for determining investment priorities and posture, the Air Force "aim[ed] to be a smaller, but superb, force that maintains the agility, flexibility, and readiness to engage a full range of contingencies and threats."[1]

There is no doubt that the Air Force has become smaller over the years, but there comes a point when capacity begins to limit operational capability. In the words of then-Secretary of the Air Force Heather Wilson, "It's no surprise that the Air Force we have is...smaller than the Air Force we need."[2]

The years of funding shortfalls, coupled with wartime demands and the weight of an ever-aging fleet of aircraft, would not allow the service to reverse the downward spiral in capability, capacity, and readiness. The Air Force was forced to make strategic trades in capability, capacity, and readiness to meet the operational demands of the war on terrorism and develop the force it needed for the future. Budgetary uncertainty throughout the five years after passage of the Budget Control Act had many cumulative and detrimental effects on the USAF, which, while it sustained the war on terrorism and began to modernize its aging fleet of aircraft, struggled to sustain the type of readiness required to employ in a major regional contingency (MRC) against a near-peer threat.

Presidential defense budgets from 2012 through 2017 during the Obama Administration proved merely aspirational and forced



SOURCE: Stephen Losey, "Aircraft Mission-capable Rates Hit New Low in Air Force, Despite Efforts to Improve," *Air Force Times*, July 26, 2019, https://www.airforcetimes.com/news/your-air-force/2019/07/26/aircraft-mission-capable-rates-hit-new-low-in-air-force-despite-efforts-to-improve/(accessed July 29, 2019).

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deeper trade-offs in capability, capacity, and readiness for operational employment, all of which put the Air Force in an ever-expanding readiness trough. When funding did arrive, it was through continuing resolutions that, passed well into the year of execution, prevented any real form of strategic planning.[3] The collective effects left the Air Force of 2016 with just four of 32 active-duty fighter squadrons ready for conflict with a near-peer competitor and just 14 others that were considered ready for low-threat combat operations.[4]

During a series of speeches in 2018, Secretary Wilson and Air Force Chief of Staff General David Goldfein laid out a plan to build the "Air Force We Need" that included more flying hours for pilots and expanding the number of Air Force squadrons from 312 to 386.[5] Those goals, coupled with an order by then-Secretary of Defense James Mattis to increase mission-capable rates for the F-16, F-22, and F-35 aircraft to 80 percent by the end of September 2019,[6] has given the Air Force the potential to reverse the critical areas of capacity, capability, and readiness trends.

Both the Air Force goals and the Mattis order assume that commensurate funding is made available and applied to those efforts, and the current Administration has taken significant steps to ensure that the money is available to make both happen. Since President Trump's inauguration, the Air Force budget has increased incrementally to a level that is now 25 percent higher ($33.2 billion) than it was when he took office.[7] Unfortunately, the Air Force has had little measurable success in using that funding to bolster any of those critical areas.

Capacity

Fifteen years of trading capacity for readiness funding to further modernization has meant serious reductions in the bottom-line number of available fighter, bomber, tanker, and airlift platforms. In 1991, the USAF had 2,476 fighters and 290 bombers in its

TABLE 3

Total Active-Duty Aircraft Inventory

	2016	2017	2018	End 2019 Total
A-10	143	143	143	143
AC-130J	29	28	35	41
B-1	61	62	62	62
B-2	20	20	20	20
B-52	58	58	58	58
C-130H	13	4	3	0
C-130J	85	94	104	105
C-5	36	33	36	36
C-12	28	28	28	28
C-17	170	147	154	146
C-20	5	0	—	0
C-21	17	17	19	19
C-32	4	4	4	4
C-37	12	12	12	12
C-40	4	4	4	4
CV-22	49	50	50	50
E-3	31	31	31	31
E-4	4	4	4	4
E-9	2	2	2	2
E-11A	—	—	4	4
EC-130H	14	14	14	13
F-15	317	313	316	316
F-16	570	570	557	548
F-22	165	166	166	166
F-35	102	123	161	212
HC-130J	19	19	19	23
HC-130N	2	2	0	0
HH-60	78	86	82	89
KC-10	59	59	59	53*
KC-135	156	155	147	146*
KC-46	11	16	28	34*
MC-130H	13	16	16	15
MC-130J	35	37	37	41
MQ-9	228	225	220	228
NC-135	1	1	1	1
OC-135	2	2	2	2
RC-135	22	22	22	22
RQ-4	7	33	36	36
T-1	178	178	178	178
T-6	445	445	444	444
T-38	506	505	504	504
T-41	4	4	3	3
T-51	3	3	3	3
T-53	25	24	24	24
TC-135	3	3	3	3
TG-15	5	5	5	5
TG-16	19	19	19	19
TH-1	28	28	28	28
TU-2	5	5	5	4
U-2	27	27	27	26
UH-1	68	68	68	68
UV-18B	3	3	3	3
VC-25	2	2	2	2
WC-135	2	2	2	2

* FY 2019 total numbers are contingent upon acquisition of six KC-46 aircraft.

SOURCE: Headquarters U.S. Air Force response to query by The Heritage Foundation.

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active-duty inventory[8] in addition to 692 tankers and 392 strategic airlift platforms in its total force inventory that were available to execute Desert Storm.[9] The trade-offs in the following years resulted in a 2018 Air Force that had just 1,473 fighters and 140 bombers in its active force and 441 tankers and 278 strategic airlift assets in its total force inventory.[10] (See Chart 11).

The force required to fight, fuel, and resupply a war with China across the vast expanse of the Pacific would need to be much larger than the force that was employed in Desert Storm. The tanker bridge would need to be much longer and more robust,[11] and the airlift capacity required to move and sustain those assets would be greater even without the plethora of air bases that were available to the allied force in 1991. It is hard to fathom how the current number of total force tanker and strategic airlift aircraft assets would be sufficient to fulfill the associated requirements.

Facing shortfalls in the Air Force's current requirement to support combatant commanders' deterrence and warfighting requirements, Secretary Wilson commissioned a study to determine the size and composition of the force needed to meet the new defense strategy. The study revealed that the service requires another 74 operational squadrons, to include 14 more tanker, one more airlift, seven more fighter, and five more bomber squadrons, to meet those needs. In general terms, that equates to at least 210 more KC-46 tankers, 15 more C-17 transport aircraft, 50 more bombers, and 182 more fighter aircraft than the Air Force currently has in its inventory.

Considering such a finding, one would probably expect the Air Force to increase its procurement budget, both for FY 2020 and for the Future Years Defense Program (FYDP), by a substantial margin. However, and in spite of a $10.8 billion increase in the FY 2020 budget, the procurement request submitted to the White House actually fell by $100 million, while the research, development, test, and evaluation (RDT&E) request increased by $4.5 billion. This left the acquisition rates for the F-35 and KC-46 flat at 48 and 15 aircraft, respectively, throughout the FYDP.

The RDT&E budget has increased from $19.6 billion to $35.4 billion (more than 80 percent) since FY 2017, and many argue that this increase was hardwired to meet B-21 and follow-on air dominance platform requirements. However, it is hard to imagine the Air Force, if its FY 2020 budget had been reduced by $4.5 billion rather than increased by $10.8 billion, cutting the funding for other spending categories to sustain the $4.5 billion increase in RDT&E. In short, increasing RDT&E at the expense of capacity and operational readiness was a strategic choice.

That said, the reduction in programmed fourth-generation fighter retirement rates, coupled with the arrival of F-35As on Air Force flight lines in Florida, Arizona, and Utah, finally reversed a 67-year downward spiral in the total Air Force aircraft inventory,[12] and for the first time in as many years, the Air Force added 53 aircraft to its roster for a projected total of 5,426 at the end of FY 2019.[13] (See Table 3.)

Today, the average age of Air Force aircraft is more than 29 years, yet the service—even with its FY 2018, FY 2019, and FY 2020 budget increases—has no plans to increase the acquisition rates for any major weapons system.[14] It is instead relying on Congress to increase the USAF procurement budget to cover what it perceives as a budget shortfall. The decades-long trend of steadily declining aircraft numbers, coupled with the fleet's ever-growing average age, may be lulling senior leaders into believing that the service can be fixed sometime in the future, but the numbers tell a different story.

In 1987, there were 29 active-duty Air Force fighter squadrons based in Europe alone. The combination of post–Cold War downsizing and spending caps mandated by the Budget Control Act of 2011 (BCA) caused the Air Force to shrink from 70 combat-coded[15] active-duty fighter squadrons during Operation Desert Storm[16] to just 55 across the whole of the Active, Guard, and Reserve force. As of 2019, just 32 of those fighter squadrons were in the active-duty force.[17]

For the purpose of assessing capacity and readiness, this *Index* uses "combat-coded" fighter aircraft maintained within the Active component of the U.S. Air Force as a primary indicator of capacity. Combat-coded aircraft and related squadrons are aircraft and units with an assigned wartime mission, which means those numbers exclude units and aircraft assigned to training, operational test and evaluation (OT&E), and other missions. The software and munitions carriage/delivery capability of aircraft in noncombat-coded units renders them incompatible with or less survivable than combat-coded versions of the same aircraft. For example, all F-35As may appear to be ready for combat, but training wings and test and evaluation jets have hardware and software limitations that would severely curtail their utility and effectiveness in combat. While those jets could be slated for upgrades, hardware updates sideline jets for several months, and training wings and certain test organizations generally will be the last to receive those upgrades.

The Heritage *Index of U.S. Military Strength* assesses that a force of 1,200 combat-coded fighter aircraft is required to execute a two-MRC strategy. This number is also reflected in testimony presented to Congress by Air Force leaders in 2015.[18]

Of the 5,426 manned and unmanned aircraft projected to be in the USAF's inventory at the end of FY 2019, 1,374 are active-duty fighters, and 951 of these are combat-coded aircraft.[19] This number includes all active-duty backup inventory aircraft as well as attrition reserve spares.[20]

However, the number of fighters and fighter squadrons available to deploy to contingency operations affects more than wartime readiness; it also affects retention. The constant churn of overseas deployments and stateside temporary duty (TDY) assignments is one of the primary reasons cited by pilots for separating from the service. This problem can be solved in two ways: by decreasing operational tempo and/or by increasing capacity. When the order to deploy assets comes from the President, the Air Force must answer that call with assets capable of executing the mission no matter what the effects on morale or retention might be, which means that reducing operational tempo is not an option for Air Force leadership. This leaves increasing capacity as the only fix, and while the Air Force made a budgetary decision *not* to increase the rate at which it builds additional capacity beyond 48 F-35s a year, Congress appears to be coming through with 12 additional F-35s and six new F-15Xs in the proposed FY 2020 budget.

Nevertheless, neither the Air Force nor Congress appears to be acting to fill the shortfall in air refueling or strategic lift assets more rapidly. In spite of the Air Force identified shortfall of 14 tanker squadrons/210 air refueling aircraft, that service will continue on an unaccelerated KC-46 procurement schedule of 15 aircraft a year throughout the FYDP, and there is no plan in place to acquire additional strategic airlift assets.

The funding that facilitated the Reagan buildup of the 1980s was available for just a few years, and the assets acquired during that period are now aging out. Even the most stalwart defense hawks are saying that growth in the defense budget is unlikely in the years beyond FY 2020, and unless Congress continues to intervene by acquiring more fighter assets, the opportunity to increase Air Force capacity beyond its current marginal level may be lost.

Capacity also relies on the stockpile of available munitions and the production capacity of the munitions industry. The actual number of munitions within the U.S. stockpile is classified, but there are indicators that make it possible to assess the overall health of this vital area. The inventory for precision-guided munitions (PGM) has been severely stressed by nearly 18 years of sustained combat operations and budget actions that limited the service's ability to procure replacements and increase stockpiles. In an effort to continue rebuilding the PGM stockpile, the Air Force will purchase 53,976 precision-guided munitions and guidance kits in FY 2020. Typically, there is a delay of 24–36 months between conclusion of a contract and

TABLE 4

Precision-Guided Munitions: Expenditures and Programmed Acquisitions

	Expenditures FY 2018 (estimate)	Acquisitions FY 2019 (FN1)	Acquisitions FY 2020 (FN2)
JDAM	5,297	36,000	37,000
HELLFIRE	1,828	3,734	3,859
SDB–I/II	700	6,254	8,253
APKWS	–	6,879	5,400
JASSM	19	360	430
LGB	373	0	0
Maverick	16	0	0
Totals	**8,982**	**53,976**	**55,691**

SOURCE: Headquarters U.S. Air Force, A8XC/A5RW, written response to Heritage Foundation request for information on Air Force precision-guided munitions expenditures and programmed replenishments, July 10, 2018. heritage.org

delivery of these weapons, which means that munitions are often replaced three years after they were expended.

During the past three years, however, funding for munitions has improved significantly, and the preferred munitions inventory is starting to recover to pre-war levels. (See Table 4).

Capability

The risk assumed with capacity has placed an ever-growing burden on the capability of Air Force assets. The ensuing capability-over-capacity strategy centers on the idea of developing and maintaining a *more*-capable force that can win against the advanced fighters and surface-to-air missile systems now being developed by top-tier potential adversaries like China and Russia, which are also increasing their capacity.

Any assessment of capability includes not only the incorporation of advanced technologies, but also the overall health of the inventory. Most aircraft have programmed life spans of 20 to 30 years based on a programmed level of annual flying hours. The bending and flexing of airframes over time in the air generates predictable levels of stress and fatigue on everything from metal airframe structures to electrical wiring harnesses.

The average age of Air Force aircraft is 28 years, and some fleets, such as the B-52 bomber, average 58 years. In addition, KC-135s comprise 87 percent of the Air Force's tankers and are over 57 years old on average. The average age of the F-15C fleet is over 35 years, leaving less than 6 percent of its useful service life remaining,[21] and that fleet comprises 44 percent of USAF air superiority platforms.[22] The Air Force is considering the F-15C for airframe modifications through a service life extension program (SLEP), but with or without a SLEP, that hard-to-maintain system will likely stay in the inventory at least through 2030.

The fleet of F-16Cs are 29 years old on average,[23] and the service has used up nearly 85 percent of its expected life span. The Air Force recently announced its intent to extend the service lives of 300 F-16s with a plan to keep those jets flying through 2050.[24] SLEPs lengthen the useful life of airframes, and these F-16 modifications also include programmed funding for the modernization of avionics within

TABLE 5

Total Air Force Inventory (Page 1 of 3)

Aircraft	Total Aircraft Inventory	Average Age in Years	FY 2017 Mission-Capable Rate	FY 2018 Mission-Capable Rate	Change, 2017 to 2018	Average Number of Mission-Capable Aircraft
A010C	282	37	74%	73%	-1.25%	204
AC130J	11	2	91%	87%	-4.11%	9
AC130U	12	28	83%	87%	4.02%	10
B-1B	62	31	53%	52%	-1.04%	32
B-2A	20	24	54%	61%	6.87%	12
B-52H	75	57	72%	69%	-2.52%	52
C-130H	177	28	73%	68%	-4.84%	121
C-130J	124	9	77%	77%	-0.28%	95
C-17A	222	15	84%	83%	-1.12%	183
CV022B	50	6	67%	59%	-7.20%	30
E003B	11	40	69%	69%	-0.15%	8
E003C	2	35	67%	70%	2.99%	1
E003G	17	38	75%	66%	-8.73%	11
E008C	16	18	64%	67%	2.80%	11
EC130H	14	45	74%	73%	-1.09%	10
EC130J	7	18	66%	66%	0.40%	5
F015C	212	34	71%	71%	0.23%	152
F015D	23	34	70%	69%	-0.99%	16
F015E	218	26	75%	71%	-4.10%	155
F016C	785	28	70%	70%	-0.19%	550
F016D	154	28	66%	66%	0.28%	102
F022A	186	11	49%	52%	2.73%	96
F035A	148	3	55%	50%	-5.12%	73
HC130J	24	4	84%	81%	-3.58%	19
HC130N	6	24	55%	61%	6.89%	3
HC130P	3	52	34%	21%	13.13%	1
HH060G	97	28	69%	71%	1.72%	69
HH060U	3	7	0%	0%	—	—
KC010A	59	34	78%	80%	1.50%	47
KC135R	344	57	73%	73%	-0.17%	251
KC135T	54	58	75%	74%	-1.46%	40
LC130H	10	33	50%	45%	-5.17%	5
MC012W	35	8	0%	100%	—	35

TABLE 5

Total Air Force Inventory (Page 2 of 3)

Aircraft	Total Aircraft Inventory	Average Age in Years	FY 2017 Mission-Capable Rate	FY 2018 Mission-Capable Rate	Change, 2017 to 2018	Average Number of Mission-Capable Aircraft
MC130H	17	30	69%	68%	–0.41%	11
MC130J	36	4	84%	79%	–5.05%	28
MC130P	2	52	46%	55%	9.07%	1
MQ001B	94	11	91%	92%	1.04%	86
MQ009A	247	5	90%	90%	0.66%	223
NC135W	1	56	0%	0%	—	—
OC135B	2	56	86%	65%	–21.39%	1
RC135S	3	56	69%	79%	10.34%	2
RC135U	2	53	82%	83%	1.57%	2
RC135V	8	54	71%	71%	–0.17%	6
RC135W	12	55	66%	60%	–5.52%	7
RC026B	11	24	0%	0%	—	—
RQ004B	35	7	74%	74%	–0.63%	25
T001A	178	24	56%	59%	2.96%	105
T038A	53	52	75%	73%	–1.95%	38
T038C	442	51	60%	61%	1.42%	270
T041D	4	49	0%	0%	—	—
T051A	3	13	0%	0%	—	—
T053A	24	6	0%	0%	—	—
T006A	444	13	76%	66%	–10.07%	293
TC135W	3	56	75%	76%	1.52%	2
TE008A	1	28	81%	85%	4.35%	1
TG010D	4	16	0%	0%	—	—
TG014A	4	15	0%	0%	—	—
TG015A	2	15	0%	0%	—	—
TG015B	3	15	0%	0%	—	—
TG016A	19	6	0%	0%	—	—
TH001H	28	37	65%	73%	7.93%	21
TU002S	4	34	73%	69%	–4.29%	3
U002S	27	35	75%	77%	1.70%	21
UH001N	63	46	84%	82%	–1.61%	52
UV018B	3	34	0%	0%	0.00%	
VC025A	2	28	93%	90%	–2.94%	2

TABLE 5

Total Air Force Inventory (Page 3 of 3)

Aircraft	Total Aircraft Inventory	Average Age in Years	FY 2017 Mission-Capable Rate	FY 2018 Mission-Capable Rate	Change, 2017 to 2018	Average Number of Mission-Capable Aircraft
WC130H	5	52	53%	27%	–26.58%	1
WC130J	10	17	59%	65%	6.63%	7
WC135C	1	54	50%	72%	21.86%	1
WC135W	1	56	65%	75%	10.50%	1

NOTE: The average number of mission-capable aircraft is calculated as the Total Aircraft Inventory multiplied by the Mission-Capable Rate.
SOURCE: Stephen Losey, "Aircraft Mission-capable Rates Hit New Low in Air Force, Despite Efforts to Improve," *Air Force Times*, July 26, 2019, https://www.airforcetimes.com/news/your-air-force/2019/07/26/aircraft-mission-capable-rates-hit-new-low-in-air-force-despite-efforts-to-improve/(accessed July 29, 2019).

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those airframes. However, those modifications are costly, and the added expense consumes available funding, reducing the amount the services have to invest in modernization, which is critical to ensuring future capability. Even with a SLEP, there is a direct correlation between aircraft age and the maintainability of those platforms. (See Table 5.)

The Air Force's ISR and lift capabilities face similar problems in specific areas that affect both capability and capacity. The majority of the Air Force's ISR aircraft are now unmanned aerial vehicles (UAVs),[25] but even here the numbers fell in 2018 from 371[26] to 251 with the complete retirement of the MQ-1 Predator weapons system.[27] The RQ-4 Global Hawk is certainly one of the more reliable of those platforms, but gross weight restrictions limit the number of sensors that it can carry, and the warfighter still needs the capability of the U-2, a jet with an average age of 36 years and no scheduled retirement date.[28]

The E-8 Joint Surveillance Target Attack Radar System (J-STARS) and the RC-135 Rivet Joint are critical ISR platforms, and each was built on the Boeing 707 platform, the last one of which came off the production line 40 years ago in 1979. The reliability of the USAF fleet of 707 airframes is at risk because of the challenges linked to aircraft age and flight hours, and those aircraft need to be modernized. In the 2019 National Defense Authorization Act (NDAA), Congress elected not to recapitalize the J-STARS fleet, a decision that is in line with the service's belief that the platform could not survive in a modern high-threat environment. In its stead, the Air Force is working on an incremental approach for a J-STARS replacement that focuses on advanced and disaggregated sensors (a system of systems) that will require enhanced and hardened communications links. Known as the Air Battle Management System (ABMS), it is envisioned as an all-encompassing approach to both airborne and ground Battle Management Command and Control (BMC2) that will allow the Air Force to fight and support joint and coalition partners in the high-end engagements ahead.[29]

A service's investment in modernization ensures that future capability remains healthy.

Investment programs aim not only to procure enough to fill current capacity requirements, but also to advance future capabilities with advanced technology.

The Active Air Force has just 105 F-15Cs left in its fleet, and concerns about what platform will fill this role when the F-15C is retired are well justified. The Department of Defense (DOD) planned to purchase 750 F-22A stealth air superiority fighters to replace the F-15C, but draconian cuts in the program of record reduced the acquisition to just 183 total F-22As for the Active, Guard, and Reserve force.[30]

Fulfilling the operational need for air superiority fighters will be further strained in the near term because of the F-22's low availability rates and a retrofit that always causes some portion of those jets to be unavailable for operational use. The retrofit is a mix of structural alterations required for the airframe to reach its promised service life, and the process takes six F-22s off the flight line for the retrofit at any given time. The retrofit is forecasted to continue through 2021.[31] The Raptor's 62.8 percent availability rate means that of the 138 combat-coded F-22As on active duty, approximately 72 are available to fly combat sorties at any given time.[32] That low mission-capable rate means in turn that even with their superior technology, and adding in the Guard's 20 jets, the total mission-capable inventory would be 85 jets, which likely would not be sufficient to fulfill the single-MRC wartime requirement for air superiority fighters.

The Air Force's number one priority remains the F-35A, the next-generation fighter scheduled to replace all legacy multirole and close air support aircraft. A host of developmental problems caused this new fighter's initial operating capability (IOC) date to be pushed from 2013 to 2016. However, the jet's full operating capability (FOC) was delivered in early 2018 with the fielding of 3F software, and every F-35 pilot interviewed at Hill Air Force Base voiced full confidence in this weapons system if called to employ the F-35A in the highest-threat environment.[33] The updated software and required hardware modifications are already incorporated in jets coming off the production line[34]

The rationale for the Air Force's 1,763-aircraft program of record is to replace every F-117, F-16, and A-10 aircraft on a one-for-one basis.[35] The F-35A's multirole design favors the air-to-ground mission, but its fifth-generation faculties will also be dominant in an air-to-air role, allowing it to augment the F-22A in many scenarios.[36] As noted, Heritage analysis has identified a requirement for 1,200 combat-coded active-duty fighters. Even accounting for additional aircraft for training, testing, and OT&E, the acquisition of 1,763 would well exceed the combat-coded fighter requirement. The active-duty Air Force has 138 combat-coded F-22As and a stated intent to retain several hundred more fourth-generation fighters on active duty through the mid-2040s. Taking those aircraft into consideration, the Air Force should reduce the F-35A program of record to 1,260 fighters and move to accelerate the rate at which it acquires those platforms.[37]

A second top acquisition priority is the KC-46A air refueling tanker. The KC-46 has experienced a series of delays, the latest of which involves foreign object debris (FOD) inside the jet's cabin, which, in addition to being a safety hazard when operating the plane, implies poor quality control by the manufacturer. The Air Force expects to receive 24 KC-46s by the end of FY 2019 and an additional 28 in FY 2020 for a total of 52 on the ramp by the end of FY 2020.[38] It also intends to acquire 15 additional KC-46 Pegasus tankers a year through 2028, at which time it will have all 179 of these new tankers in service. The KC-46 will replace less than half of the current tanker fleet and will leave the Air Force with over 200 aging KC-135s that still need to be recapitalized.[39]

The third major USAF acquisition priority is the B-21 Raider, formerly called the Long-Range Strike Bomber (LRSB). The USAF awarded Northrop Grumman the B-21 contract to build the Engineering and Manufacturing Development (EMD) phase, which includes associated training and support systems and initial production lots. The program

completed an Integrated Baseline Review for the overall B-21 development effort as well as the jet's Preliminary Design Review. The Air Force is committed to a minimum of 100 B-21s at an average cost of $564 million per plane.[40]

With the budget deal that was reached for FY 2018 and FY 2019, the Secretary of the Air Force announced the service's intent to retire all B-1s and B-2s and sustain a fleet comprised of 100 B-21s and 71 B-52s.[41] The B-21 is programmed to begin replacing portions of the B-52 and B-1B fleets by the mid-2020s.[42] In the interim, the Air Force continues to execute a SLEP on the entire fleet of 62 B-1s in the inventory to restore all 289 B-1 engines to their original specifications. The Air Force plans to modernize the B-2's Defense Management System, Stores Management Operational Flight Program, and Common Very-Low-Frequency/Low Frequency Receiver Program to ensure that this penetrating bomber remains viable in highly contested environments, keeping it fully mission capable until it is replaced by the B-21.

Modernization efforts are also underway for the B-52. The jet was designed in the 1950s, and the current fleet entered service in the 1960s. The FY 2018 budget funded the re-engineering of this fleet, and the aircraft will remain in the inventory through 2050.

When the Secretary of the Air Force and the Chief of Staff rolled out the Air Force's plan to expand the size of the service from 312 to 386 squadrons, one of the stated elements of that campaign was to fill the ranks of those new squadrons with only the newest generation of aircraft—F-35s, B-21s, and KC-46s—because of the capabilities that those platforms bring to bear.[43] Curiously, the Air Force is now seeking to acquire the fourth-generation F-15X, based primarily on projected operating cost savings, to increase fighter capacity.[44] Although the service will certainly increase its numbers with that approach, the capability of the F-15X system will not be survivable in the high-threat environment in which deployed assets will be required to fight by the time that fielding has been completed.

Readiness

According to the USAF's official FY 2020 posture statement, more than 90 percent of the "lead force packages" within the service's 204 "pacing squadrons" are "ready to 'fight tonight.'" Unpacking that statement is challenging even for the most experienced airmen because the terms "pacing unit" and "pacing squadron" are new and the definition is somewhat elusive. Assuming that a pacing squadron is an operational unit that is fully qualified and ready to execute its primary wartime mission (C1), one is still left wondering what "lead force packages" within those 204 pacing/mission-ready units might mean. The posture statement goes on to say that those "pacing squadrons are on track to reach 80% readiness before the end of Fiscal Year 2020."[45]

When taken together, these statements imply that only portions of the Air force's mission-ready/pacing units are mission capable/currently qualified to execute the unit's primary wartime mission. The available open-source readiness indicators, coupled with Air Staff responses to direct requests for information, bring clarity and support to that assessment.

In 2017, the Secretary of the Air Force and the Chief of Staff informed Congress that "[w]e are at our lowest state of full spectrum readiness in our history."[46] In the two years since their testimony, however, the DOD seems to have stifled open conversation or testimony about readiness. Even though things have improved, there are enough facts and ancillary evidence to conclude that the substance of their statements still applies in 2019. Overcoming the effects of previous years of overtasking in low-threat contingency operations, as well as the lack of full-spectrum, high-threat training, is a task that clearly will require many years.

Full-spectrum operations include continued support of counterterrorism (CT) operations, the seamless conduct of nuclear deterrence operations, and readiness for potential conflict with a near-peer competitor. In 2016, Major General Scott West informed the House Armed Services Committee Subcommittee on Readiness that the Air Force was "able

TABLE 6

Air Force Maintenance Skill Level Manning

Skill Level	2017	2018
Apprentice: 3-level	119%	117%
Journeyman: 5-level	91%	91%
Craftsman: 7-level	96%	97%
Leadership: 9-level	96%	99%

SOURCE: Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information on Air Force manning levels, April 9, 2018.

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to conduct nuclear deterrence operations and support CT operations, [but] operations against a near-peer competitor would require a significant amount of training" because readiness is out of balance "at a time when the Air Force is small, old, and heavily tasked."[47] Two areas that offer insight into how well the Air Force is doing with regard to retraining for a near-peer fight are aircraft mission-capable (MC) rates and the rate at which aircrew members are flying, which is generally measured in sorties and hours per month.

MC rates are defined as the percentage of aircraft possessed by a unit that are capable of executing the unit's mission set. Several factors drive MC rates, but two are common to mature systems: manning and operations and maintenance (O&M) funding. Taken together, they dictate the number of sorties and flight hours that units have available for aircrew training. One of sequestration's many detrimental impacts on the Air Force became apparent in 2014 with a shortage of aircraft maintenance personnel (maintainers). At its height at the close of 2015, that shortfall grew to more than 4,000 highly skilled aircraft maintainers.[48] Senior leaders cited this gap in maintenance manning as the principal reason why fighter pilots who once averaged over 200 hours per year were fortunate to fly slightly more than 120 hours in 2014.[49]

By the close of FY 2017, the maintenance shortfall in both manning and qualifications had been reduced significantly, and by the end of FY 2018, the gaps for all four qualification levels had reached or exceeded historical norms, removing maintenance manning as a primary reason for low sortie rates. (See Table 6.)

Another area of concern is pilot manning levels. In March 2017, Lieutenant General Gina M. Grosso, Air Force Deputy Chief of Staff for Manpower, Personnel, and Services, testified that at the end of FY 2016, the Air Force had a shortfall of 1,555 pilots across all mission areas (608 Active, 653 Guard, and 294 Reserve). Of that total, the Air Force was short 1,211 fighter pilots (873 Active, 272 Guard, and 66 Reserve).[50] The numbers continued to fall, and at the end of FY 2017, the Air Force was short more than 2,000 pilots. Although the Air Force stopped breaking the numbers down into Active, Guard, and Reserve numbers, the total pilot shortfall appears to remain at 9 percent.[51] Recovering from that shortfall will depend on how well the Air Force addresses several major issues, especially the available number of pilot training slots, an area in which it appears that some progress is being made.

In 2018, the Air Force graduated 1,200 pilots. The projections for 2019 forecast increases to 1,300, rising to 1,480 in 2020. Those projected numbers rely on a graduation rate of nearly 100 percent for every pilot training class, and the service is already close to that

TABLE 7

Operational Fighter Pilot Manning

Weapons System	Pilot Manning Authorized	Qualified Fighter Pilots 2017	Qualified Fighter Pilots 2018
F–22	233	193	188
F–35A	107	33	46
F–15C	149	124	132
F–16C	787	677	771
F–15E	307	264	276
A–10	184	144	166
All Jets	**1,766**	**1,434** (81% manning)	**1,579** (89% manning)

NOTES: Pilot manning authorized figures are based on actual manning percentages (actual manning divided by authorized manning) in each major weapons system established in Air Force Instruction 11-102. Qualified fighter pilots figures are derived from actual manning percentages (actual manning divided by authorized manning) for each major weapons system.
SOURCES: Secretary of the Air Force, "Air Force Instruction (AFI) 11-102: Flying Hour Program Management," August 30, 2011, p. 17, https://static.e-publishing.af.mil/production/1/af_a3_5/publication/afi11-102/afi11-102.pdf (accessed July 24, 2019), and Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information on Air Force manning levels, April 9, 2018.

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mark. In 2016, the graduation rate was 93 percent; in 2017, it was 98 percent; and in 2018, it was 97 percent.[52] At the same time, however, the expectation of high graduation rates during years of significant pilot shortfalls puts quality at risk, and it is hard to fathom how the pilot production pipeline is going to ensure that all of those who earn their wings will be as competent and capable as they need to be in the years ahead.

The Air Force is still suffering a pilot shortage, but it has done an excellent job of emphasizing operational manning at the cost of placing experienced fighter pilots at staffs and schools. Operational fighter pilot manning in every major fighter weapons system increased by an average of 8 percent in 2018. (See Table 7.)

While pilot manning levels are improving, those numbers say little about the qualifications of the pilots within those weapons systems. "Higher sortie rates mean increased proficiency for our combat aircrews," in the words of General Bill Creech,[53] and given the right number of sorties and quality flight time, it takes seven years beyond mission qualification in a fighter for an individual to maximize his potential as a fighter pilot.[54] With an 18-year drought in training for combat with a near-peer competitor, it will take even highly experienced fighter pilots a year or two of training to master the skill sets required to dominate the air against a near-peer competitor in a high-threat environment—skill sets that most have never had the opportunity to develop. Because squadrons have a mix of experience and talent levels, it will take several years of robust training for any operational fighter squadron to become ready for a high-end fight.

The associated training requires sortie rates averaging above three sorties a week or

TABLE 8

Operational Sorties Pilots Received per Month, by Aircraft

	2017	2018	Difference
F-22	7.4	7.3	–1%
F-35A	7.9	7.5	–5%
F-15C	8.9	8.4	–6%
F-16C	9.1	9.3	2%
F-15E	8.8	8.5	–3%
A-10	9.2	9.7	6%
All Jets: Average Sorties per Month	**8.8**	**9.5**	**8%**
All Jets: Average Sorties per Week	**2.2**	**2.4**	**9%**

SOURCE: Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information on Air Force manning levels, July 8, 2018.

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more and flying hours averaging more than 200 hours per year. Despite having made great strides in sortie production since 2014, the Air Force is still falling short of those thresholds because of its low fighter mission-capable rates. (See Table 8.)

As noted, the primary drivers for mission-capable rates are maintenance manning

TABLE 9

Average Hours Fighter Pilots Received per Month

	2017	2018	Difference
F-22	13.4	12.1	–10%
F-35A	11.5	11.0	–4%
F-15C	12.5	8.9	–29%
F-16C	14.2	13.9	–2%
F-15E	20.6	17.1	–17%
A-10	22.7	20.1	–11%
All Jets: Average Hours per Month	**15.8**	**14.3**	**–9%**
All Jets: Average Hours per Year	**189.4**	**171.7**	**–9%**

NOTE: Average hours are based on weighted fighter manning levels for each of the six major weapons systems.
SOURCE: Headquarters U.S. Air Force, Deputy Chief of Staff for Operations, written response to Heritage Foundation request for information on Air Force manning levels, July 8, 2018.

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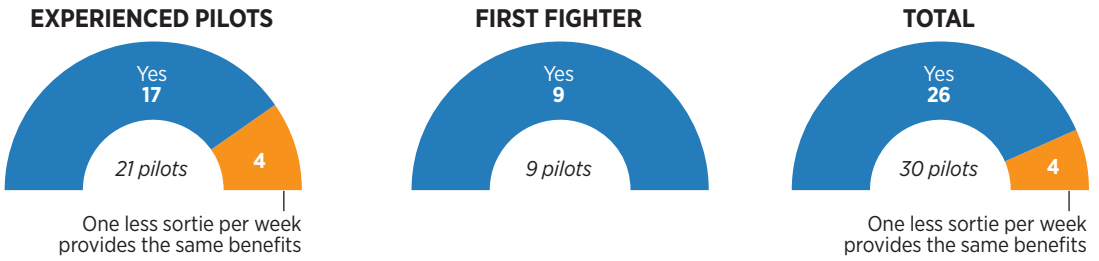
CHART 12

How Many Sorties per Week Should Pilots Fly?

Q: "Do you agree with this statement regarding proficiency and sorties per week? If I fly two sorties or less a week, my skills in the jet diminish; flying three per week maintains and sustains my skills, and when I fly four times or more a week, my skills in the jet improve across the board."



SOURCE: John Venable, "The F-35A Fighter Is the Most Dominant and Lethal Multi-Role Weapons System in the World: Now Is the Time to Ramp Up Production," Heritage Foundation *Backgrounder* No. 3406, May 14, 2019, https://www.heritage.org/defense/report/the-f-35a-fighter-the-most-dominant-and-lethal-multi-role-weapons-system-the-world.

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and O&M funding. Maintenance manning has been healthy for more than two years, and O&M funding has risen by 16 percent since 2017, but flying hours across the fleet of fighters have increased by just 9 percent over that same period. USAF leadership has not increased the flying hour budget for FY 2020 because of an assessment that the Air Force is flying at the maximum executable levels.[55] This calls into question how well maintenance is organized to generate those sorties.

The sortie production recovery that took place at the end of the hollow-force days of the Carter Administration happened while levels of maintenance experience and inventories of spare parts were still low and well before the Reagan Administration's increase in defense spending.[56] The maintenance organization that created that turnaround was changed in 1989 to "save money by reducing maintenance staffing, equipment and base level support,"[57] which may help to explain the lackluster performance. No matter what the rationale may be, even with robust manpower and funding, flying hours and sortie rates are still short of the levels required for a rapid increase in readiness levels across the fighter force.

The sortie rate for the average Air Force fighter pilot was said to have risen to 16.4 hours a month in 2017,[58] but data provided by the Air Force organization charged with tracking these details revealed a less favorable picture. Fighter pilots actually received an average of 15.8 hours per month in 2017, and the average fell by 9 percent to 14.3 hours per month in 2018.[59] (See Table 9.)

The average line fighter pilot assigned to a combat-coded (operational) unit received a healthy rate of 17.6 hours per month in 2017, but that rate fell by 9 percent in 2018 to 16 hours per month.[60] Sortie rates for the same category of pilots increased from 2.2 to 2.4 sorties per week during the same years but remained well below the average of three sorties per week needed to sustain or grow readiness levels. (See Chart 12).

The current state of overall Air Force readiness includes many intangibles, but the things like averages for fighter pilot sortie rates and hours per month that can be measured all point to a readiness level that did not increase markedly between 2017 and 2018. The first five months of 2019 have shown an improvement in both sortie rates and hours, but the same was true in 2018, and flying hours fell to below 2017 levels by the end of 2018. With that in mind, any assessment of 2019 will have to wait until the end of the year.

Space

The classified nature of deployed space assets and their capabilities makes any assessment of this mission area challenging. Nevertheless, the United States' constellation of ISR, navigation, and communication satellites is arguably unrivaled by any other nation-state. This array allows the Air Force and its sister services to find, fix, and target virtually any terrestrial or sea-based threat anywhere, anytime.

Unfortunately, America's historically unchecked dominance in space has encouraged an environment of overreliance on the domain and underappreciation of the vulnerabilities of its capabilities.[61] Some space assets represent nearly single-point failures in which a loss caused by a system failure or an attack could cripple a linchpin capability. Because of U.S. dominance of and nearly complete reliance on assets based in space, for everything from targeting to weapons guidance, other state actors have every incentive to target those assets.[62]

Adversaries will capture and hold the initiative by leveraging surprise and every asymmetric advantage that they possess while denying those warfighting elements to their opponents. Since Operation Desert Storm, the world and every American near-peer competitor therein have watched the United States employ satellite-enabled precision targeting to profound effect on the battlefield. That ability depends almost entirely on the kinetic end of the strike system: precision-guided munitions.[63]

China and Russia are investing heavily in ground-based anti-satellite (ASAT) missiles; orbital ASAT programs that can deliver a kinetic blow; or co-orbital robotic interference to alter signals, mask denial efforts, or even pull adversary satellites out of orbit.[64] If near-peer competitors were able to degrade regional GPS signals or blind GPS receivers, they could neutralize the PGMs that the U.S. uses to conduct virtually every aspect of its kinetic strike capability.

As General John Hyten, former Commander of Air Force Space Command, has clearly indicated, the vulnerability of the U.S. space constellation lies in its design.[65] Each of the satellites on which we currently rely costs millions of dollars and takes years to design, build, and launch into orbit. Until the Air Force shortens that time span or diversifies its ability to find, fix, and destroy targets with precision, space will remain both a dominant and an incredibly vulnerable domain for the U.S. Air Force.

Scoring the U.S. Air Force

Capacity Score: Marginal

One of the key elements of combat power in the U.S. Air Force is its fleet of fighter aircraft. In responding to major combat engagements since World War II, the Air Force has deployed an average of 28 fighter squadrons, based on an average of 18 aircraft per fighter squadron. That equates to a requirement of 500 active component fighter aircraft to execute one MRC. Based on government force-sizing documents that count fighter aircraft, squadrons, or wings, an average of 55 squadrons (990 aircraft) is required to field a force capable of executing two MRCs (rounded up to 1,000 fighter aircraft to simplify the numbers). This *Index* looks for 1,200 active fighter aircraft to account for the 20 percent reserve necessary when considering availability for deployment

TABLE 10

Mission-Capable Combat-Coded Fighters in Active Duty Air Force

Fighter	Combat-Coded Fighters	Average Age in Years	FY 2018 Mission-Capable Rate	Mission-Capable Combat-Coded Fighters
A-10C	116	37	0.73	84
F-15C	105	34	0.71	75
F-15E	158	26	0.71	112
F-16C	369	28	0.70	258
F-22A	138	11	0.52	72
F-35A	65	3	0.50	32
	951	**—**	**—**	**634**

SOURCE: Air Force Association, "USAF Almanac 2018," *Air Force Magazine*, June 2018, "The Air Force in Facts and Figures," http://www.airforcemag.com/MagazineArchive/Pages/TableOfContents.aspx?Date=06/2018 (accessed July 25, 2019).

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and the risk of employing 100 percent of fighters at any one time.

- **Two-MRC Level:** 1,200 fighter aircraft.
- **Actual 2019 Level:** 951 fighter aircraft.

Based on a pure count of combat-coded fighter/attack platforms that have achieved IOC, the USAF currently is at 79 percent of the two-MRC benchmark. While the active fighter and bomber assets available would likely prove adequate to fight a single regional conflict, when coupled with the low mission capability rates of those aircraft (see Table 10), the global sourcing needed to field the required combat fighter force assets would leave the rest of the world uncovered. Nevertheless, the capacity level is well within the methodology's range of "marginal." This score is now trending upward.

Capability Score: Marginal

The Air Force's capability score is "marginal," the result of being scored "strong" in "Size of Modernization Program," "marginal" for "Age of Equipment" and "Health of Modernization Programs," but "weak" for "Capability of Equipment." These scores have not changed from the *2019 Index*'s assessment. However, with new F-35 and KC-46 aircraft continuing to roll off their respective production lines, this score is now trending upward.

Readiness Score: Marginal

The Air Force scores "marginal" in readiness in the *2020 Index,* the same grade it received in the *2019 Index*. The USAF's sustained pilot deficit and systemically low sortie rates and flying hours are the principal reasons for this assessment.[66] The Air Force should be prepared to respond quickly to an emergent crisis and retain full readiness of its combat airpower and, with a significant curtailment in deployments to support the war on terrorism, begin to improve its full-spectrum readiness levels much more rapidly than we have witnessed to date.

Fighter pilots should receive an average of three or more sorties a week and 200 hours per year to develop the skill sets needed to survive in combat. Even with greatly improved maintenance manning/experience levels and

increased funding levels, average monthly sorties and flying hours have not reached those thresholds. Whether they can or will be sustained for the length of time it will take to recover from the ongoing readiness shortfall is therefore open to question.

Overall U.S. Air Force Score: Marginal

This is an unweighted average of the USAF's capacity score of "marginal," capability score of "marginal," and readiness score of "marginal."

The shortage of pilots and flying time for those pilots degrades the ability of the Air Force to generate the amount and quality of combat air power that would be needed to meet wartime requirements. Although it could eventually win a single major regional contingency in any theater, if the Air Force had to go to war today, its attrition rates would be significantly higher than those sustained by a ready, well-trained force.

U.S. Military Power: Air Force

	VERY WEAK	WEAK	MARGINAL	STRONG	VERY STRONG
Capacity			✓		
Capability			✓		
Readiness			✓		
OVERALL			✓		

AIR FORCE SCORES

1 2 3 4 5
Weakest ⟷ Strongest

Procurement and Spending ■ Through FY 2019 ■ Pending

Strategic Bomber

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
B-52 Stratofortress Inventory: **75** Fleet age: **56.8** Date: **1961** The B-52, the oldest of the bombers, provides global strike capabilities with conventional or nuclear payloads. Programmed upgrades for B-52 include a new communications, avionics, and Multi-Functional Color Displays. The Air Force plans to use this aircraft through the 2050s	1	2	The B-21 is an advanced stealth bomber that will replace all B-1s and B-2s within the Air Force bomber fleet. Flight testing is scheduled for 2021. Fielding is expected in the mid-2020s.		
B-1 Lancer Inventory: **62** Fleet age: **31.1** Date: **1986** The B-1B is a supersonic all-weather conventional bomber. It was modified in the mid-1990s to disable its nuclear weapon delivery capability. Block 16 upgrades to be completed by 2020 include a fully integrated data link, navigation, radar, and diagnostic upgrades. B-1B phase-out is scheduled for 2032.	3				
B-2 Spirit Inventory: **20** Fleet age: **24.2** Date: **1997** The B-2 bomber provides the USAF with global strike capabilities for both nuclear and conventional payloads. The stealth bomber's communication suite is currently being upgraded. The current plan is to begin phasing the B-2 out in 2032.	4	4			

NOTE: See page 433 for details on fleet ages, dates, and procurement spending.

AIR FORCE SCORES

1 2 3 4 5
Weakest ⟷ Strongest

Procurement and Spending ■ Through FY 2019 ■ Pending

Ground Attack/Multi-Role Aircraft

PLATFORM	Age Score	Capability Score
A-10 Thunderbolt II Inventory: **281** Fleet age: **37.4** Date: **1977** The A-10 is the only USAF platform designed specifically for close air support mission using both self-designated precision guided munitions and an internal 30MM cannon. The A-10 is scheduled to be phased out in 2030.	2	2
F-16C Falcon Inventory: **235** Fleet age: **28** Date: **1980** The F-16 is a multirole aircraft capable of tactical nuclear delivery, all-weather strike, and Suppression of Enemy Air Defenses (SEAD). An ongoing Service Life Extension Program (SLEP) will keep this jet in the inventory through the late 2040s.		
F-35A Lightning Inventory: **154** Fleet age: **3.6** Date: **2016** The F-35 is a multirole stealth fighter that became operational in 2016. The Air Force has received more than 200 of a planned purchase of 1,763 aircraft.	5	5
F-15E Strike Eagle Inventory: **218** Fleet age: **26.4** Date: **1989** The F-15E is a multirole aircraft capable of all weather, deep interdiction/attack, and tactical nuclear weapons delivery. Upgrades include an AESA radar, EPAWSS self-defense suite, a new central computer, and cockpit displays.	2	2

REPLACEMENT PROGRAM	Size Score	Health Score
F-35A Timeline: **2016–TBD** The F-35A "Lightning" is a multirole stealth fighter that became IOC on August 2, 2016. The Air Force plans to acquire 48 F-35As a year across the FYDP. **PROCUREMENT** 338 1,425 **SPENDING** *($ millions)* $45,485 $186,382	5	3

NOTE: See page 433 for details on fleet ages, dates, and procurement spending.

Fighter Aircraft

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
F-15C/D Eagle Inventory: **235** Fleet age: **34.2** Date: **1975** The F-15C/D is an air superiority fighter that has been in service since the late 1970s. The jet is receiving upgrades including a new AESA radar and self-defenses needed to survive and fight in contested airspace. Discussions are underway to retire the F-15C in late 2020s.	1	2	The F-15EX will be based on the 2-seat F-15QA (Qatar) configuration upgraded with USAF-only capabilities, including the Eagle Passive Active Warning and Survivability System (EPAWSS) and advanced Operational Flight Program (OFP) software. The PB for FY20 will acquire 8 F-15EXs in FY20 and a total of 80 over the FYDP.		
F-22A Raptor Inventory: **187** Fleet age: **11** Date: **2005** The F-22 is the preeminent air superiority stealth fighter aircraft, modified to enable delivery of precision guided weapons delivery. The jet is currently undergoing a modification called RAAMP that will improve reliability, maintainability and performance	4	5			

NOTE: See page 433 for details on fleet ages, dates, and procurement spending.

Tanker

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
KC-10 Extender Inventory: **59** Fleet age: **33.7** Date: **1981** The KC-10 is a multirole tanker and airlift platform that can refuel both boom and drogue compatible fighters on the same mission. Recent modifications have enabled a service life extension through 2045. The Air Force planned to retire the KC-10 by 2024, but with a shortfall of refueling platforms, and slow acquisition of the KC-46, that appears unlikely.	2	5	**KC-46** Timeline: **TBD** The KC-46 Pegasus will replace portions of the KC-135 tanker fleet. The program entered low rate initial production in August 2016 and the Air Force accepted the first Pegasus on January 10, 2019. After several production and delivery delays, Boeing is on track to deliver three jets a month through the end of 2019 and 15 a year throughout the FYDP. **PROCUREMENT** 67 108 **SPENDING** *($ millions)* $11,238 $21,177	3	3
KC-135 Stratotanker Inventory: **344** Fleet age: **57.8** Date: **1957** The KC-135 is a multirole tanker/airlift platform. The aircraft has undergone several modifications, mainly engine upgrades, to improve performance and reliability. Part of the fleet will be replaced with the KC-46, with the remainder scheduled to be in service through 2040.	1				
KC-46 Pegasus Inventory: **67** Fleet age: **n/a** Date: **n/a** The Pegasus is a multirole tanker/airlift platform that can refuel both boom and drogue compatible fighters on the same mission. The Air Force accepted the first of 179 programmed aircraft in 2019. Deliveries will continue at a rate of 15 aircraft a year.	5	n/a			

NOTE: See page 433 for details on fleet ages, dates, and procurement spending.

AIR FORCE SCORES

1 2 3 4 5
Weakest ⟷ Strongest

Procurement and Spending ■ Through FY 2019 ■ Pending

Heavy Lift

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
C–5M Galaxy Inventory: **51** Fleet age: **31.4** Date: **1970** The C-5 is the USAF's largest mobility aircraft. It can transport 270,000 pounds of cargo over intercontinental ranges. The "M" models are heavily modified C-5A/Bs that have new engines, avionics, and structural/ reliability fixes. Ongoing mods include a new weather radar and mission computer, and improved Large Aircraft IR Countermeasures (LAIRCM).	2	5	None		
C-17 Globemaster III Inventory: **222** Fleet age: **15** Date: **1995** The C-17 is a large, air refuellable transport aircraft that is capable of operating on small, austere airfields (3,500 ft by 90 ft). Ongoing mods include next generation Large Aircraft Infrared Countermeasures (LAIRCM), structural, safety, and sustainment mods.	4				

Medium Lift

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
C-130J Super Hercules Inventory: **110** Fleet age: **9.8** Date: **2006** The C-130J is an improved tactical airlift platform that can operate from small, austere airfields, and provide inter-theater airlift and airdrop and humanitarian support. The Air Force active component completed transition to the C-130J in October 2017.	5	5	**C-130J** Timeline: **2006–2022** An upgraded medium-lift capability with multiple variants including the C-130J-30, AC-130J gunship, and HC-130 rescue/air refueling platform. The C-130J-30 can carry 92 Airborne troops and lift over 40,000 pounds of cargo. The current MYP procures 16 C-130Js per year through FY2023. **PROCUREMENT** 137 4 **SPENDING** *($ millions)* $10,987 $510	5	4

NOTE: See page 433 for details on fleet ages, dates, and procurement spending.

AIR FORCE SCORES

1 2 3 4 5
Weakest ⟷ Strongest

Procurement and Spending ■ Through FY 2019 ■ Pending

Intelligence, Surveillance, and Reconnaissance (ISR)

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
RQ-4 Global Hawk Inventory: **33** Fleet age: **7.6** Date: **2011** The RQ-4 is an unmanned aerial vehicle (UAV). Unlike the MQ-1 or MQ-9, the RQ-4 is a high-altitude, long-endurance (HALE) UAV, which in addition to higher altitude has a longer range than medium-altitude, long-endurance (MALE) UAVs.	4	3	None		
MQ-9 A/B Reaper Inventory: **218** Fleet age: **5.4** Date: **2007** The MQ-9 is a hunter/killer Remotely Piloted Aircraft (RPA) with EO/IR and SAR targeting capabilities and is capable of station times in excess of 24 hours. The Extended Range modification adds external fuel tanks, a four-bladed propeller, engine alcohol/water injection, heavyweight landing gear, longer wings and tail surfaces.	5	2	**MQ-9** Timeline: **2007–2017** The MQ-9 "Reaper" is a proven hunter/killer unmanned Aerial Vehicle (UAV). The PB for FY 2019 budget funds the procurement of 24 Reapers, and the proposed PB for 2020 will fund 12 more. **PROCUREMENT** 387 / 43 **SPENDING** *($ millions)* $6,996 / $1,664	5	5
RC-135 Rivet Joint Inventory: **25** Fleet age: **55** Date: **1972** The RC-135 is a manned ISR platform that collects electronic and signals intelligence with real time analysis and dissemination for tactical forces, combatant commanders, and National Command Authorities. Ongoing upgrades include new direction finding COMINT, precision ELINT/SIGINT system integration, wideband SATCOMS, enhanced near real-time data dissemination, and new steerable beam antenna.	1	4	None		
U-2 Dragon Lady Inventory: **27** Fleet age: **34.7** Date: **1956** The U-2 is a manned strategic high-altitude, long-endurance ISR platform. Capable of SIGINT, IMINT, and MASINT collection, it can carry a variety of advanced optical, multispectral, EO/IR, SAR, SIGINT, and other payloads simultaneously. No other aircraft in the US inventory has this capability, which will indefinitely delay the U-2's retirement.	1				

NOTE: See page 433 for details on fleet ages, dates, and procurement spending.

Command and Control

PLATFORM	Age Score	Capability Score	REPLACEMENT PROGRAM	Size Score	Health Score
E-3 AWACS Inventory: **31** Fleet age: **38.2** Date: **1977** The E-3 is an airborne warning and control system (AWACS) that delivers all-weather, air and maritime surveillance, command and control, battle management, target, threat, and emitter detection, classification, and tracking. Ongoing upgrades include an urgent operational requirement to shorten kill-chains on time-sensitive targets, modernizing airborne moving target indication, and adding high-speed jam-resistant Link 16. The E-3 is scheduled to stay in service through the 2040s.	1	2	None		
E-8 JSTARS Inventory: **16** Fleet age: **17.8** Date: **2010** The E-8 is a ground moving target indication (GMTI), airborne battlefield management/command and control platform. Its primary mission is providing theater commanders with ground surveillance data to support tactical operations. The Air Force plans to retire this platform in the mid-2020s.					

NOTES: See Methodology for descriptions of scores. The date is the year the platform reached initial operational capability. The timeline is from the year the platform reached initial operational capability until its final procurement. Spending does not include advanced procurement or research, development, test, and evaluation.

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8. The rationale for using active-duty fighter and bomber aircraft and total force numbers for Tanker and Strategic Airlift platforms is based on the mission set. Active-duty fighter and bomber squadrons are required to maintain readiness levels that allow them to deploy and successfully employ into a full-spectrum combat situation within days if not hours of notification. Readiness levels in Guard and Reserve squadrons are such that those units may require six months to a year of training before their qualified manning levels enable them to deploy with the same expectations for success. The mission demands and requirements for Tanker and Strategic Airlift squadrons allow Guard and Reserve squadrons to deploy rapidly and employ as effectively as any active-duty unit with the same mission. As will be noted in the paragraphs on capacity, due to years of underfunding of operational training, even active-duty pilots are nowhere near the level of readiness required to employ successfully against a near-peer competitor without taking serious losses.
9. Table E-2, "Air Force Total Aircraft Inventory (TAI) by Mission"; Table E-5, "Air Force Selected Total Aircraft Inventory (TAI) by Mission/Designation"; and Table E-6, "Air Force Reserve Selected Total Aircraft Invent[ory] (TAI) by Mission/Designation," in U.S. Air Force, Deputy Assistant Secretary (Cost and Economics), Assistant Secretary of the Air Force (Financial Management and Comptroller of the Air Force), *United States Air Force Statistical Digest, Fiscal Year 1992*, 1994, pp. E-103, E-107, and E-108, https://media.defense.gov/2011/Apr/19/2001330026/-1/-1/0/AFD-110419-005.pdf (accessed July 29, 2019).
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11. Air mileage from Spokane, Washington, to Manila, Philippines, is roughly equal to the distance from New York, New York, to Doha, Qatar, (6,693 miles and 6,836 miles, respectively), but the lack of available intermediate stopover/refueling locations means that more tanker aircraft would be required just to move assets from one location to another. Sustaining an air war in the Pacific would be that much more challenging.
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