Research Report

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RAND Project AIR FORCE

Prepared for the United States Air Force

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Preface

The composition of Air Force active and reserve forces is often contentious, with leadership of the active and reserve components, their proponents in the Congress, advocacy groups, and policy analysts seeing the issue through different lenses. During a force drawdown, which the Air Force currently faces as part of a broader, budget-driven reduction in defense spending, contention rises. This document is intended to inform force composition decisions by clarifying issues that affect the suitability of missions for assignment to the reserve components. It builds on earlier RAND work that addressed costs and other aspects of the active/reserve mix.

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Summary

As the Air Force plans and implements budget-driven force structure reductions, questions about the right mix of forces have emerged from the active component (AC), the reserve components (RC), and other stakeholders. This document seeks to illuminate the factors that bear on the suitability of various missions for assignment to the RC and should therefore be considered in force mix deliberations. We note at the outset that past force reductions have not been proportional across the components. Nor do we believe that proportionality should be the basis for future reductions. Rather, carefully assessed suitability of the AC and RC to provide force structure for various missions, with cost and effectiveness as a primary concerns, should drive force composition decisions.

Considerations

A primary consideration is the relative *availability* of the RC for meeting both strategic and operational taskings from combatant commanders. This availability is tempered by *statutory and funding restrictions* on the use of reservists for active missions. These restrictions establish a primary focus on reserve force training and administration by both full-time reservists and part-time reservists while funded under reserve appropriations. This reduces the utility of the RC as an operational reserve. We also found that management of the *Military Personnel Appropriation (MPA) man-day program* is not optimal for fully utilizing the RC as an operational reserve, primarily because the man-day program does not explicitly consider access to lower RC flying-hour costs available in some missions.

In our discussion of relative AC and RC *costs*, we stress that cost comparisons are meaningful only when costs are expressed in terms of useful unit outputs. For flying units, we identify those outputs as owned aircraft (with ready aircrews and maintenance workforces), total flying hours, and operational flying hours.[1] Broadly, we find that RC units tend to have lower aircraft ownership costs, that AC and RC total flying hour costs tend to be in similar ranges, and that costs per operational output tend to be lower in AC units. However, we find that the relatively small scale of many RC flying unit operations tends to increase their costs per output and in some cases undermines the suitability of assigning a mission to the RC. Among missions we examined closely, the tanker (KC-135) mission stood out as being a poor fit for the RC, at least in the way that it is currently being executed.

Some of the factors that affect cost also affect *fleet service life*. Although the ratios are not fixed, AC units tend to have a higher ratio of operational to training flying hours. As a result, operational demands in a mission can be met with fewer total flying hours across the fleet dedicated to that mission. Fewer fleet flying hours per year yields more years of fleet service life.

[1] Relying on previous research, our assessments of the relative costs of AC and RC flying units are much deeper than for other types of units.

These various availability and cost considerations interact in ways that led us to identify three criteria for evaluating the suitability of missions for assignment to the RC:

- Surge demand: Force structure is suitably placed in the RC only if there is an anticipated wartime or other episodic surge in demand for forces.
- Duration of activations: Missions with shorter activation periods are more suitable for assignment to the RC.
- Continuation training requirements: Missions with a pronounced continuation training requirement are more suitable for assignment to the RC.

We explored seven additional considerations, each of which formed a criterion for evaluating the suitability of missions for assignment to the RC.

- Data we developed suggest that *stress related to deployments* affects a limited number of career fields or missions in the Air Force. In general, stressed missions are less suitable for assignment to the RC, because the RC has less capacity to meet deployment demands. Only a few Air Force missions, most notably mobility missions, seemed to be experiencing deployments at the maximum limits established in defense policy. But these missions tend to be otherwise well suited to assignment to the RC.
- *Home-station operational tempo* (optempo) is similar to deployment stress, but pertains to missions that may experience high optempos without deploying.
- As in other studies, our review of *readiness* measures suggests that Air Force RC units match their AC counterparts. The readiness of flying units, however, depends on careful management of pilot experience levels.
- To *sustain* a sufficiently experienced workforce, the RC relies heavily on affiliation of individuals separating from the AC. As the ratio of AC to RC strengths in a mission drops, the mission becomes less suitable for assignment to the RC. A related consideration is the *absorption* of new pilots into operational units. Absorption must be limited so as not to adversely impact readiness but sufficient to sustain both AC and RC pilot inventories at acceptable levels. Mobility units have more flexibilities in these matters, but they are problematic in fighter units, making the fighter mission less suitable in this regard for assignment to the RC. Solutions can be found through innovative uses of organizational constructs that associate AC and RC units.
- *Overseas basing* can be a concern. Permanent overseas basing relies almost exclusively on AC force structure. To avoid excessive overseas assignments for assigned personnel, missions with overseas basing require some minimal level of rotational basing within the continental United States. Accordingly, missions with higher proportions of overseas basing are less suitable for assignment to the RC.
- Some missions can be enhanced by engaging reservists in military duties that match or complement *special competencies* carried over from their civilian occupations. Flying, civil engineering, and cyber missions are examples.
- Finally, missions that are relevant to the *needs of the states* are more suitable for assignment to the RC (specifically, to the Air National Guard [ANG]).

AC and RC forces can be configured in any of several *organizational constructs*, including equipped units, classic and active associate units, utilizing individual mobilization augmentees in active units, and sponsored reserves. We find that suitability of a mission for assignment to the

RC may be affected, from a cost perspective as well as other perspectives, by its fit to various organizational constructs.

Suitability Criteria

From the considerations discussed above, we extracted the suitability criteria shown in the rows in Tables S.1 (for representative non-space missions) and S.2 (for various space missions). We chose these missions because they are broadly representative of the kind of direct (as opposed to garrison support) missions around which RC wings are organized. Our evaluations (green, yellow, or red stoplights) were based on quantitative assessments in some cases and qualitative assessments in others. We note also that our assessments are heavily influenced by the demands placed on the Air Force in the past decade; those who believe similar demands will not likely be faced in the future might make some assessments differently. We found most of the evaluated missions suitable for assignment to the RC in most respects. However, every mission has some aspects that tend to limit suitability.

Table S.1. Suitability of Representative Non-Space Missions for Assignment to the RC

	F-16	C-130	KC-135	C-17	RED HORSE	Cyber	RPA (RSO)	RPA (LRE)
Surge demand	green	green	green	green	green	red	green	green
Duration of activations	green	green	green	green	red	white	green	red
Continuation training requirements	green	green	green	green	red	red	yellow	yellow
Steady-state deployment demand	green	yellow	yellow	red	yellow	green	green	red
Steady-state home-station optempo	green	yellow	yellow	red	green	green	yellow	yellow
Readiness	green	green	green	green	green	green	green	green
Absorption and sustainment	yellow	green	green	green	white	white	green	green
Overseas basing	yellow	green	green	green	green	green	green	yellow
Civilian competencies	green	green	green	green	green	green	white	white
State missions (applies to ANG only)	red	green	yellow	yellow	red	green	green	green

NOTES: Colors indicate how a criterion affects suitability of a mission for assignment to the RC: green = suitable, yellow = marginally unsuitable, red = very unsuitable, white = not applicable. RED HORSE = Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers; RPA = remotely piloted aircraft; RSO = remote split operations; LRE = launch and recovery element.

Table S.2. Suitability of Space Missions for Assignment to the RC

	Launch	Range	Test	Satellite Ops	Warning	Depl Control	In-Place Control	Educ/ Tng	Overall
Surge demand	yellow	green	green	yellow	red	green	yellow	white	yellow
Duration of activations	green	green	green	green	green	green	green	white	green
Continuation training requirements	green	green	green	green	green	green	green	green	green
Steady-state deployment demand	green	green	green	green	green	yellow	green	green	green
Steady-state home-station optempo	yellow	green	green	yellow	yellow	yellow	yellow	white	yellow
Readiness	green	green	green	green	green	green	green	green	green
Absorption and sustainment	green	green	green	green	green	green	green	green	green
Overseas basing	green	green	green	green	yellow	green	green	green	green
Civilian competencies	green	white	green	green	red	red	green	green	yellow
State missions (applies to ANG only)	red	red	red	red	red	red	red	red	red

NOTE: Colors indicate how a criterion affects suitability of a mission for assignment to the RC: green = suitable, yellow = marginally unsuitable, red = very unsuitable, white = not applicable.

Significant surge and continuation training requirements make the four flying missions we examined very well suited to the RC, especially in its role as a strategic reserve. The mobility flying missions, particularly in the C-17, were high on our list of missions that experience the highest deployment demand and home-station optempo. If the mobility force structure had been shifted more toward the AC during the past decade, stress would have been reduced on both the AC and the RC. Absorption, sustainment, and overseas basing considerations somewhat limit the suitability of assigning the F-16 mission to the RC, although the absorption issue can be managed through innovative use of associate units. With respect to the ANG, fighters seem to have no relevance to state missions, while tankers and strategic airlift seem to have limited relevance.

The RED HORSE mission employs civil engineering specialties, many of which have high deployment demands. Man-day tours for civil engineer specialties were also higher than for most other specialties with heavy man-day usage. Both considerations suggest some limitations on the suitability of assigning this mission to the RC. Additionally, the RED HORSE mission has little or no continuation training requirements. Cost considerations are adversely affected by statutory and funding constraints requiring a training rather than an operational focus on the duties of air reserve technicians (ARTs), dual-status technicians, active Guard and Reserve (AGR) personnel, and traditional reservists and guardsmen on drill and active duty for training status.

Cyber and most space missions seem to lack two critical elements that would make them suitable for assignment to the RC: limited major conflict surge demands and limited continuation training requirements.[2] In these missions, the RC is largely providing a part-time workforce that performs steady-state, in-garrison, ongoing operational duties. We have not compared the costs of RC- and AC-generated outputs in these missions, but our comparison of full-time and part-time personnel costs suggests that this force mix may be more expensive than a force that is entirely within the AC. Cost-per-output considerations are also adversely affected by the same training-oriented statutory and funding constraints that affect the RED HORSE mission. We recommend a closer look at costs and outputs in these missions, similar to the work done for flying missions in Robbert (2012).

The RPA mission is severable into two parts—a garrison-based remote split operations (RSO) mission and a forward-deployed launch and recovery element (LRE). The RSO mission has many of the characteristics of flying missions and, like the flying missions, seems well suited to assignment to the RC. One concern is that its continuation training requirements are more limited, again invoking an issue regarding training-oriented statutory and funding constraints. The LRE mission has drawbacks that make it generally unsuitable for assignment to the RC.

We also considered the fit of various organizational constructs to the missions we evaluated. Table S.3 summarizes our observations, which are based on cost and effectiveness considerations.

Table S.3 Preferred Organizational Constructs

	F-16	C-130	KC-135	C-17	RED HORSE	Cyber	RPA (RSO)	RPA (LRE)	Space
AC equipped	✓	✓	✓	✓	✓	✓	✓	✓	✓
RC equipped	✓	✓	✓	✓	✓		✓	✓	
Classic associate		✓	✓	✓	✓	✓	✓	✓	✓
Active associate	✓								
Reserve associate									
IMA	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTES: Checkmarks indicate that an indicated organizational construct is recommended for an indicated mission. IMA = individual mobilization augmentee.

In general, we find that equipped units are most appropriate in the RC when the mission entails a continuation training requirement large enough to constitute the primary usage of the equipment. RC equipped units are generally inappropriate for missions, such as cyber and space, that require close interaction with larger networks.

If the equipment, facilities, and other resources pertinent to a mission have an operational focus and a very limited training requirement, we see the classic associate or IMA construct as more useful. These constructs allow for greater integration of AC and RC contributions to the mission and avoid the cost disadvantages of tying operationally active resources (facilities, equipment, etc.) to a part-time workforce.

[2] Some units within the space and cyber missions may experience seasonal or contingency workload peaks during non-surge or post-surge periods. If so, part-time RC workforces could be organized to usefully help meet those needs.

We see limited utility in active associate units. If the purpose of these associations is to provide greater access to equipment assigned to the RC, a more straightforward approach is to rebalance the AC/RC force structure mix. The one exception we have noted to this is in the case of fighter missions, where active associate units can capitalize on the high experience levels in RC units to increase absorption capacity. We see no compelling reason to associate two RC units, which would add cost and organizational complexity with no offsetting benefits.

We find that the IMA construct is underutilized. Compared with classic associations, IMAs can be integrated with a host unit without the overhead costs and organizational complexity of a parallel wing structure.

Recommendations

Shift Force Mixes to Best Match Demands

In evaluating the suitability of missions, we recommend avoiding assignment of the RPA LRE mission to the RC. We also recommend reevaluating the costs associated with assignment of space and cyber missions to the RC, where the lack of surge and continuation training requirements suggests a low likelihood of cost-effectiveness.

Change Policies and Procedures to Better Influence Outcomes

Man-Days

Programming and management of MPA man-days does not appear to include a way to obtain the optimal mix of operational output from AC and RC units. The general philosophy of MPA man-day usage seems to be to provide relief to the AC when AC units are at or near deployment limitations. But in missions where the RC is able to produce operational flying hours at lower marginal cost than AC units (which is often the case), total operating costs can be reduced by increasing man-day availability and utilization of RC force structure while reducing the utilization of AC force structure. Careful modeling of costs and outputs is required in order to program man-days with this cost-minimizing objective.

Statutory Restrictions on Use of Technicians, Active Guard and Reservists, and Reserve Personnel Appropriation Funding

Technician, AGR, and Reserve Personnel Appropriation–funded part-time reservist duties are required by statute and appropriations language to be focused on training or administration of reserve forces. This is not an issue in flying missions with significant continuation training requirements. In non-flying missions, these constraints either add to the costs of providing operational outputs or cause units to tread on shaky legal ground. We recommend seeking legislative changes to remove these constraints.

Cost Assessments

We recommend more widespread use of cost assessments that consider both appropriately burdened (direct and indirect) costs and measured outputs. We also recommend wider dissemination of cost evaluation results so that all stakeholders gain a better understanding of how costs for various outputs differ between AC and RC units and how these cost-per-output differences affect the overall costs of various force mixes. For flying missions particularly, we recommend defining strategic, operational, and continuation training demands and corresponding unit output capacities so as to permit identifying the cost-minimizing force mixes that meet the demands.

Review and Revise Organizational Constructs

Classic associations, with parallel wing and group structures, seem to impose unnecessary overhead costs and organizational complexity. We recommend migration from a classic associate to an IMA construct in missions, typically non-flying, where tasks cannot be readily fragmented and assigned to separate AC and RC squadrons. When separate AC and RC squadrons make sense, we recommend migration away from parallel wing and group structures.

While the AC/RC force structure mix in the F-16 seems to be near optimal from a cost perspective, it does not meet absorption requirements. We recommend use of classic associate and IMA constructs to take advantage of higher RC pilot experience levels to overcome the absorption constraints.

Acknowledgements

General Philip Breedlove, as Vice Chief of Staff of the Air Force, recognized the need for a better understanding of the costs of active and reserve units and, accordingly, asked RAND Project AIR FORCE to undertake this effort. Air Force Captain Adrian Patrascu, assigned at RAND on an Education-with-Industry tour, contributed to the research.

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The document benefited significantly from critical reviews provided by RAND colleagues Anthony Rosello and Patrick Mills and editing by James Torr. Any remaining errors are our own.

Abbreviations

AC	active component
ACC	Air Combat Command
ACP	aviation continuation pay
AF/A1	Deputy Chief of Staff for Manpower, Personnel and Services
AF/A8XF	Total Force Integration Office
AFR	Air Force Reserve
AFRC	Air Force Reserve Command
AFSC	Air Force Specialty Code
AFTOC	Air Force Total Ownership Cost
AGR	active guard and reserve
AMC	Air Mobility Command
ANG	Air National Guard
APPG	Annual Planning and Programming Guidance
ART	air reserve technician
ATSO	ability to survive and operate
CAFSC	control Air Force specialty code
CAP	combat air patrol
CMAS	Command Man-day Allocation System
CMR	combat mission ready
COCOM	combatant command
CONUS	continental United States
DAFSC	duty Air Force specialty code
DCAPES	Deliberate and Crisis Action Planning and Execution Segments
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
FAIP	first-assignment instructor pilot
FAP	Fighter Associate Program
FAST	Functional Area Manager Analysis and Sourcing Tool
FMO	force mix option
IMA	individual mobilization augmentee
ISR	intelligence, surveillance, and reconnaissance
LRE	launch and recovery element
MAJCOM	major command
MDS	mission design series
MPA	Military Personnel Appropriation
OCO	overseas contingency operation
OEF	Operation Enduring Freedom
OEPM	Officer and Enlisted Personnel Management

OIF	Operation Iraqi Freedom
optempo	operational tempo
PBRC	Personnel and Budget Review Committee
PDASD RA	Principal Deputy Assistant Secretary of Defense for Reserve Affairs
PMAI	primary mission aircraft inventory
RAP	Ready Aircrew Program
RC	reserve components
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers
RI	readiness inspection
RPA	remotely piloted aircraft
RSO	remote split operations
SAF/FMC	Air Force Deputy Assistant Secretary for Cost and Economics
SR	sponsored reserves
TARS	total active rated service
TFRS	total force rated service
TWCF	Transportation Working Capital Fund

1. Introduction

The Budget Control Act of 2011 (Public Law 112-25) emerged from efforts by the Obama Administration and Congress to find a path toward reduction of large current and projected federal deficits. It requires *sequestration* (automatic, proportioned cuts in discretionary spending, including defense spending) if spending limits specified in the act are breached. Through either sequestration or more deliberately fashioned budgets, the Department of Defense (DoD) faces the likelihood of additional significant budget cuts, and therefore potentially greater reductions in the services' force structures, in coming years.

Previous research within the same project that culminated in this report found that the distribution of force structure to the active component (AC) and reserve components (RC) in some missions is not cost-optimal. Force reductions offer an opportunity to move the AC/RC mix in the direction of cost-optimality by concentrating the reductions in the component that, pre-reduction, houses a greater-than-optimum proportion of the force structure. However, the tendency of organizations to resist reductions in their resources seems to be accentuated during periods of retrenchment (Levine, 1978). Because of their stronger ties to local communities, resistance to force structure reductions seems to be particularly acute when it affects RC units. The recent actions of a group of state governors to forestall a reduction in the Air National Guard's (ANG's) C-130 force structure is an example (Hoffman, 2012). Such resistance might be reduced if RC units had greater opportunities to shift to alternative missions.

The purpose of this document is to explore such possibilities, and to illuminate AC/RC force composition decisions, by evaluating the *suitability* of various missions for assignment to the RC. Missions may be considered highly suitable for assignment to the RC if such assignment offers significant cost or other national security advantages, or at least minimally suitable if such assignment is cost-neutral and carries no other significant disadvantages.

For each mission that is suitable for assignment to the RC, there are likely to be upper and lower bounds on the proportion of the mission that is suitably placed in the RC. Conceivably, the upper bound can be high, with force structure largely or even exclusively in the RC, or low, with only a niche role for the RC.

We use the term *mission*, in this context, to refer to the capability provided by units operating an aircraft major design, such as the C-130 or the F-16, or to capabilities provided by nonflying activities with similar unity of focus found in space, intelligence, agile combat support, or other functional areas.

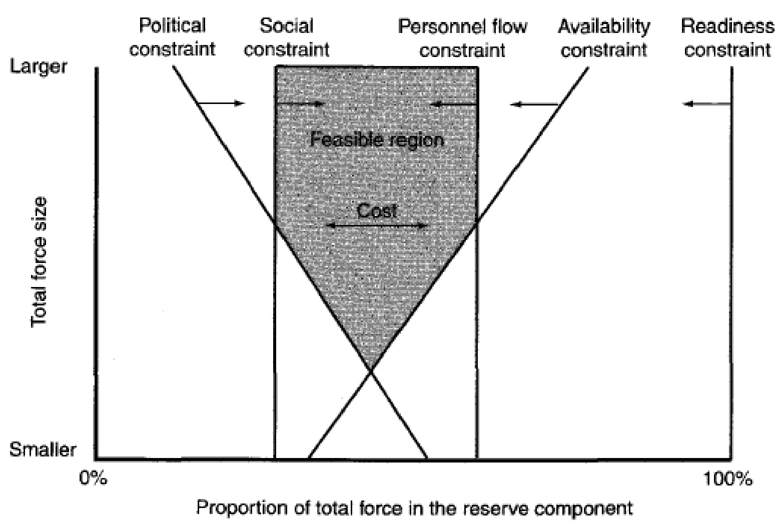
To illuminate key issues that affect suitability and the bounds of suitability, we draw on similarly motivated research conducted within RAND Project AIR FORCE over a decade ago (Robbert, Williams, and Cook, 1999) and related research conducted within RAND in the intervening years. As with earlier work, this research recognizes that cost is an important but not an exclusive consideration. Factors such as the political context of force composition decisions, deployment stress, aircrew inventory management, and accessibility of forces may affect suitability.

This analysis focuses on several major variants of AC and RC units. Units may be *independently equipped* with their own assigned aircraft or other assets. They may also be part of an *association*—a pairing in which one component's unit owns the equipment and another component's unit shares in the operation and maintenance of that equipment. Suitability of a mission for assignment to the RC may differ among these variants.

Previous Research

Robbert, Williams, and Cook (1999) identified various considerations that set conceptual bounds (whose locus may not be known) on the proportion of military forces in the RC. As indicated in Figure 1.1, certain social and political considerations were found to set lower bounds. These include a constitutional imperative for state militias, public awareness and trust of military institutions, public reaction to reserve call-ups as a check on excessive use of military forces, the influence of veterans in society, and the political influence of the RC. Other considerations—sustainability of RC personnel inventories and availability of reserve units for employment and deployment—set upper bounds. As portrayed in that earlier work, cost becomes a consideration within the bounds set by these other considerations.[3] The relevance of that earlier work to our current focus—assessing the suitability of missions for assignment to the RC—is that missions with high, unconstraining upper bounds on the proportion of the force that can be placed in the RC will generally be considered more suitable for such assignment.

Figure 1.1. Constraints on Active/Reserve Force Composition



SOURCE: Robbert et al., 1999.

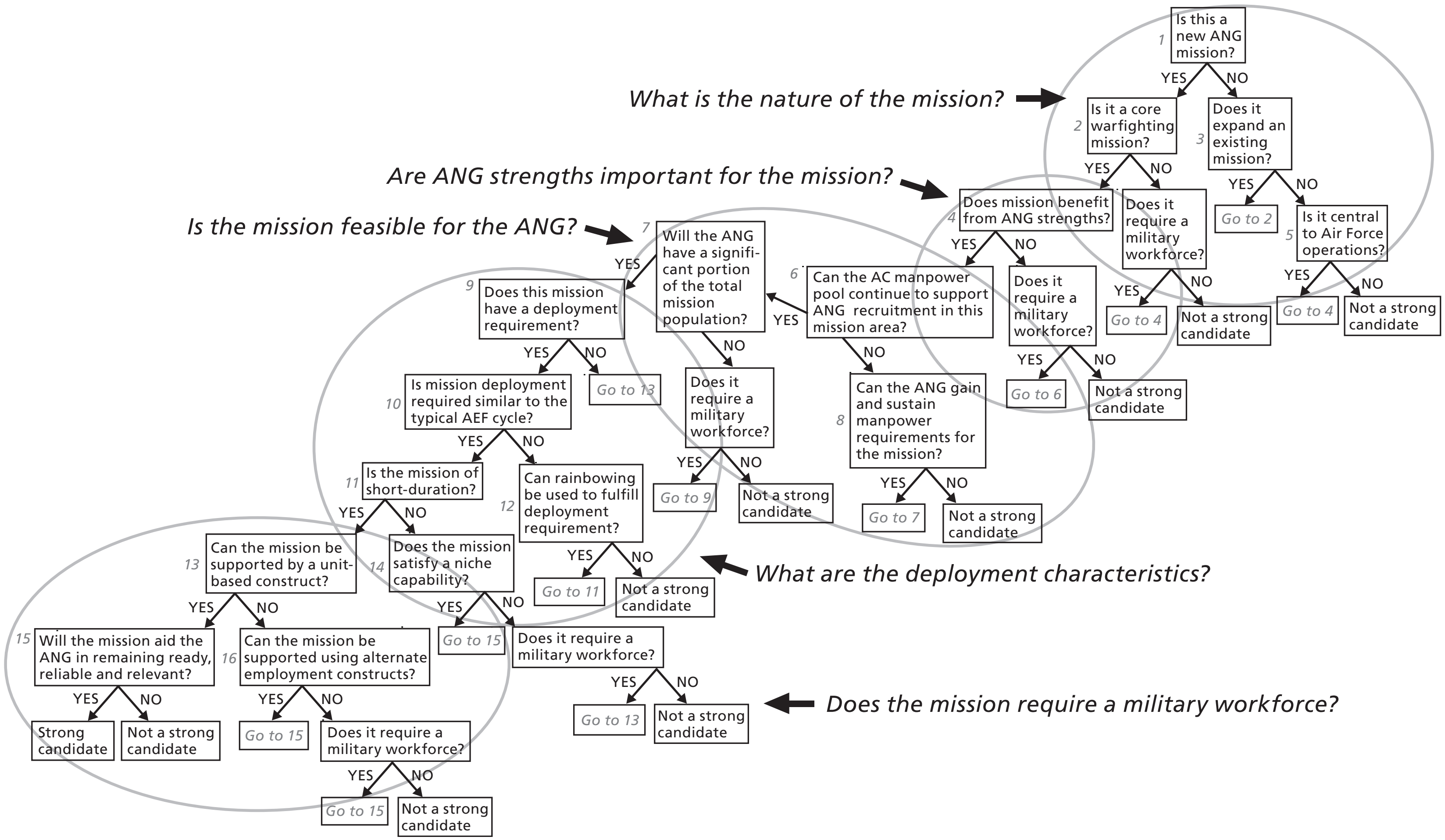
[3] Robbert, Williams, and Cook (1999) evaluated other issues, including demographic representativeness, state missions of the ANG, and readiness of RC units, finding no basis in them for constraining the active/reserve force composition.

Lynch et al. (2007), building on Robbert, Williams, and Cook (1999), developed an ANG mission assignment criteria decision tree (Figure 1.2). It further defines the factors that warrant consideration in force composition decisions. While Lynch's decision tree was developed specifically for analyzing potential ANG missions, it seems conceptually applicable to evaluating potential Air Force Reserve (AFR) missions also.

In the years since that earlier work, protracted warfighting in Afghanistan and Iraq has placed demands on the RC that are unprecedented in the absence of full mobilization. If the RC were once viewed as a *strategic* reserve—a force in readiness for major contingencies—they are now also considered an *operational* reserve—routinely employed to help meet steady-state, ongoing contingency operations. This shift in roles has produced a corresponding shift in expectations (McKenney et al., 2008; Klerman, 2008), which in turn shifts the conceptual bounds on the AC/RC mix. Hansen et al. (2011) discussed how the shift to an operational reserve has played out in an Army context, suggesting that adjustments are needed in the skill mix (roughly comparable to what we might call a mission mix) of both the AC and the RC in order to better meet current and potential deployment demands.

In evaluating these considerations, we have assumed that conditions of force deployment and utilization encountered during the previous decade will continue to some degree in the future. While future deployment demands may decrease, force sizes are likely to decrease also, resulting perhaps in relative demands that are not unlike those of the past decade. A radical shift in the ratios of operational and strategic demands to force sizes will require a further reevaluation of these considerations and how they affect the suitability of assigning missions to the RC.

Figure 1.2. Decision Tree for Force Composition Decisions



SOURCE: Lynch et al., 2007.
NOTE: AEF = air and space expeditionary force.

Force Composition Trends

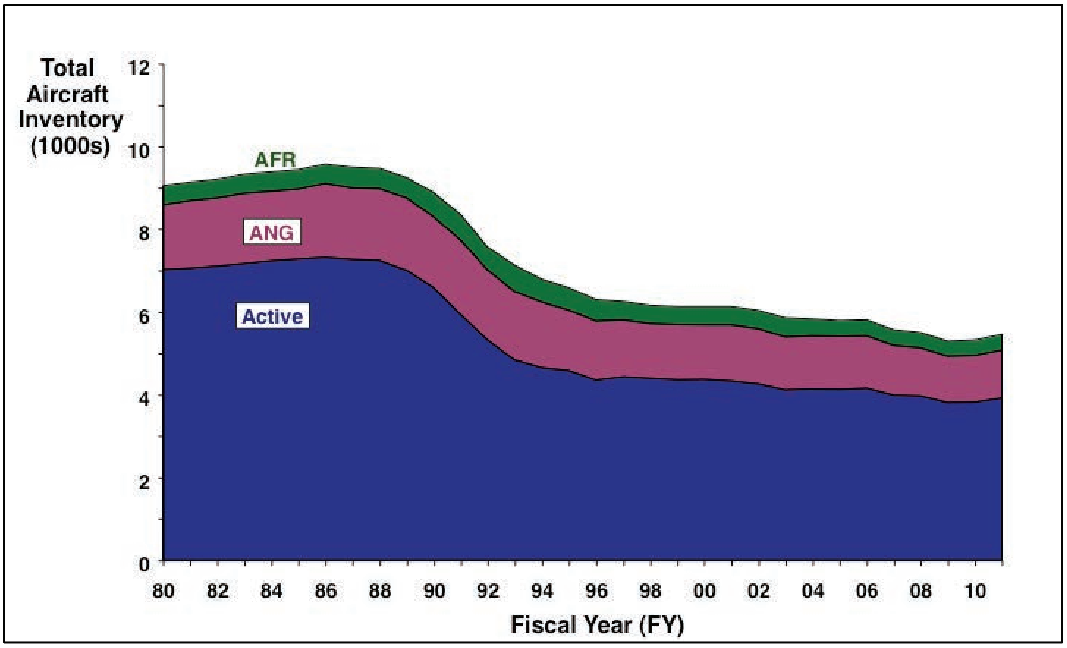
Changes in the AC/RC mix and shifts in mission assignments are likely to occur in an environment of, and to be prompted by, reductions in overall force sizes. In its proposed FY2013 budget, for example, DoD called for Air Force strength reductions that, over five years, would have reduced Air Force end strength by 9,900, with over half of the reduction coming from the ANG.

Critics of the plan contended that it was flawed because the cuts to the ANG were "out of proportion" (Serbu, 2012). In our analysis, however, we have not included proportionality as a principle that should govern force mix or mission assignment decisions. To do so would ascribe, without evidence, some sense of optimality in the existing proportion of forces or missions assigned to each component. Moreover, as the data below indicate, *proportionality* has not been observed in past force reductions, which in the post–Cold War era have been disproportionately weighted toward the AC.

Force Structure

Figure 1.3 shows the total inventory of Air Force aircraft, by component, over the past three decades. The aircraft inventory grew modestly in size during the Reagan build-up in the 1980s, then dropped significantly at the end of the Cold War. This drawdown lasted from FY1989 to FY1996. The inventory then stayed relatively constant for several years before declining again in the early 2000s. It has rebounded slightly since 2009 due to the acquisition of large numbers of unmanned aircraft systems, such as the MQ-1B Predator and MQ-9A Reaper.

Figure 1.3. Total Aircraft Inventory Count, by Component, FY1980–2011

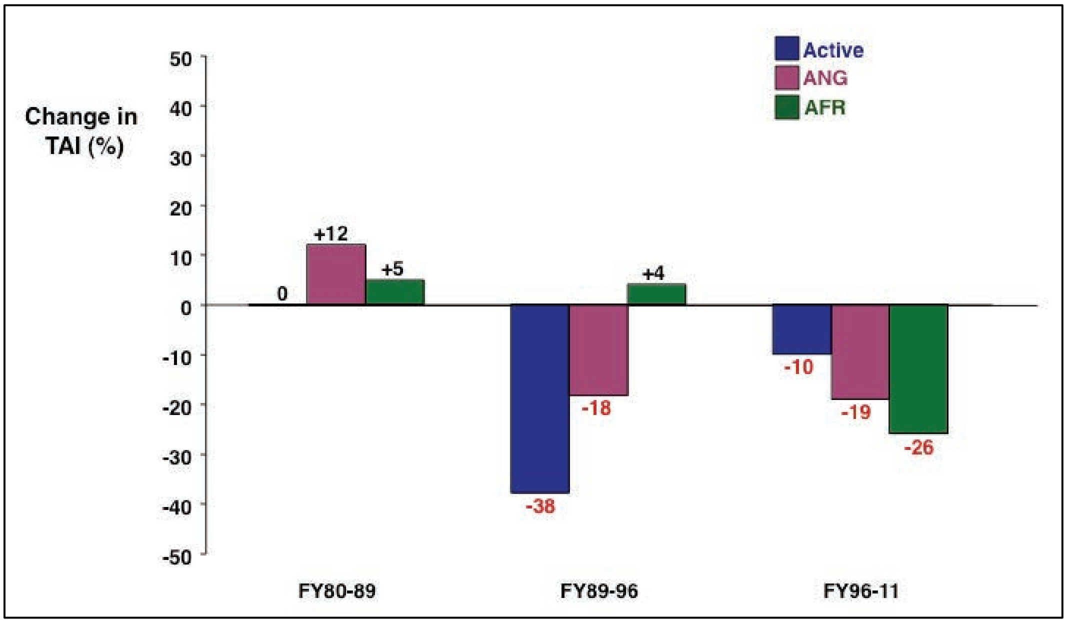


SOURCE: U.S. Air Force, Directorate of Programs, Program Integration Division (1999).
NOTE: Data indicate total active inventory (TAI).

The changes over the past 30 years have affected all force components to varying degrees. From 1980 to 1989, the AC stayed almost the same size, while the ANG and AFRC actually increased somewhat. This is illustrated in Figure 1.4. During the post–Cold War drawdown (1989 to 1996), the AC was reduced 38 percent, or more than twice as much as the ANG. The AFRC actually increased in size slightly during this period. Much of the post–Cold War drawdown was driven by reductions in forward-based forces in Europe and the Western Pacific, and reductions in the bomber fleets. As virtually all of these aircraft were in the AC, the reductions largely came from it.

This pattern was reversed somewhat over the past 15 years, with the RC decreasing roughly twice as much as the AC. Between 1996 and 2011, the AC fell an additional 10 percent, while the ANG and AFRC were reduced by 19 percent and 26 percent, respectively.

Figure 1.4. Changes in the Total Aircraft Inventory, by Component, for Three Selected Periods

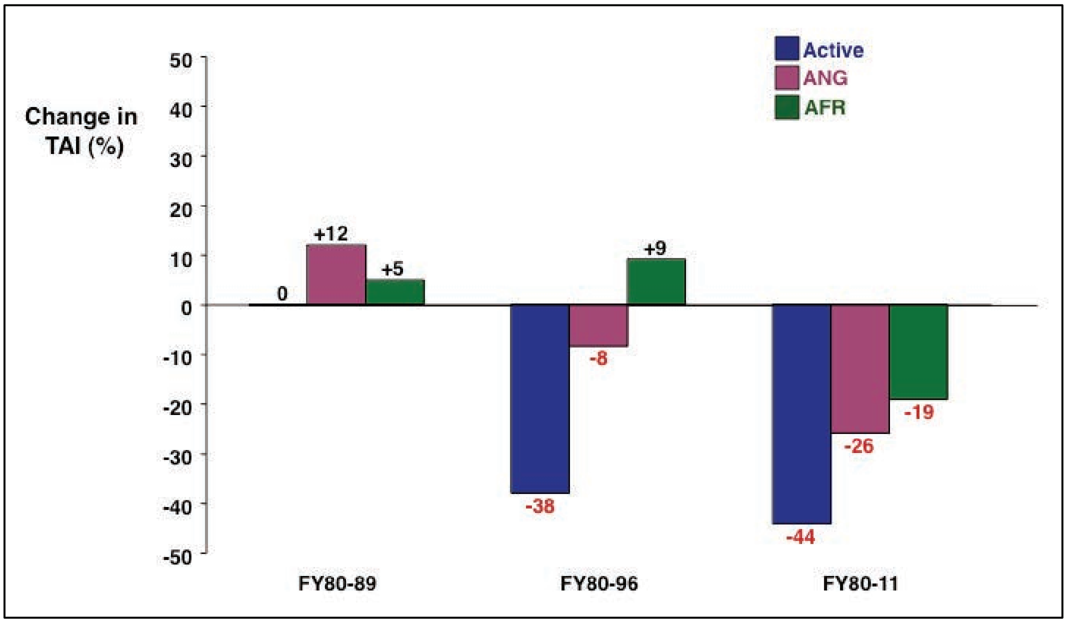


SOURCE: U.S. Air Force, Directorate of Programs, Program Integration Division (2003).
NOTE: Data indicate total active inventory (TAI).

The cumulative change from the 1980 inventory levels are shown for each force component in Figure 1.5. By FY1996, at the end of the Cold War drawdown, the AC had been reduced to a far greater extent than the ANG, while the AFRC was actually larger than it had been prior to the Reagan build-up.

At the end of FY2011, all three components were much smaller than they had been in FY1980, though the AC had been cut to a much greater extent. The AC had been reduced 44 percent, or over half again as much as the ANG, which had fallen 26 percent. The AFRC had been reduced less than either, at 19 percent.

Figure 1.5. Cumulative Changes in Total Aircraft Inventory, by Component, FY1980–2011



SOURCE: U.S. Air Force, Directorate of Programs, Program Integration Division (2006).
NOTE: Data indicate total active inventory (TAI).

There were also changes in the share of several aircraft types in the respective components. For some aircraft types, including bombers, combat search and rescue (CSAR), and trainers, the share in the AC in FY2011 was virtually identical to what it had been in FY1980. For others, the share changed considerably. Figure 1.6 shows the shift in the proportion of the total inventory in each component for several major aircraft types. Fighters, forward air control (FAC), and tactical reconnaissance aircraft (RF-4s) were grouped together because they use the same basic design type and offer similar capabilities.[4] The share of these aircraft in each component was relatively stable between FY1980 and FY2011. The only real shift occurred between FY1992–1994, when delays in the reductions in the ANG and AFRC resulted in these components having a modestly larger share of the force for a few years.

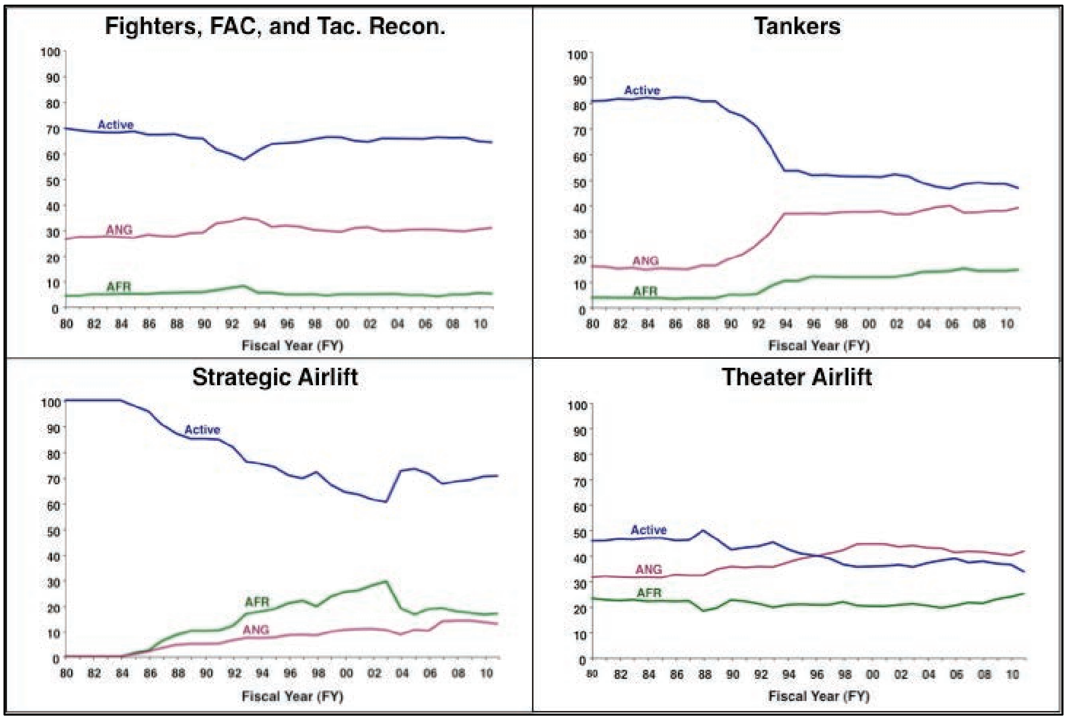
In contrast, the changes in the allocation of the tanker fleet have been significant and sustained. During the post–Cold War drawdown, approximately 160 KC-135Rs were transferred from the AC to the ANG and AFR. As a result, the share of the tankers in the AC fell from just over 80 percent to about 50 percent between FY1989 and FY1996. It declined to the current 46 percent share in the following years.

The share of strategic and theater airlifters also changed significantly between FY1980 and FY2011. Although most of the strategic aircraft remained in the AC, the share fell from 100 percent to just over 70 percent during that period. The shift in theater airlifters among the

[4] For example, for most of the past 30 years, A-10s and OA-10s (the forward air control version of the A-10) were counted in different mission categories even though the aircraft were identical, were assigned to the same squadrons, and were flown by the same pilots. The Air Force had eliminated the distinction by the end of FY2007. Because both aircraft were equally capable of performing the close air support and forward air control missions, we felt that combining the two provided a more consistent measure of the size of the force dedicated to fighter-type missions.

components has also been considerable. The share in the AC fell from just over 45 percent in FY1980 to approximately 33 percent in FY2011. The AC had fewer aircraft than the ANG, which had 42 percent. The remaining 25 percent was in the AFR.

Figure 1.6. Aircraft Inventory Proportions, by Component, Selected Aircraft Types, FY1980–2011

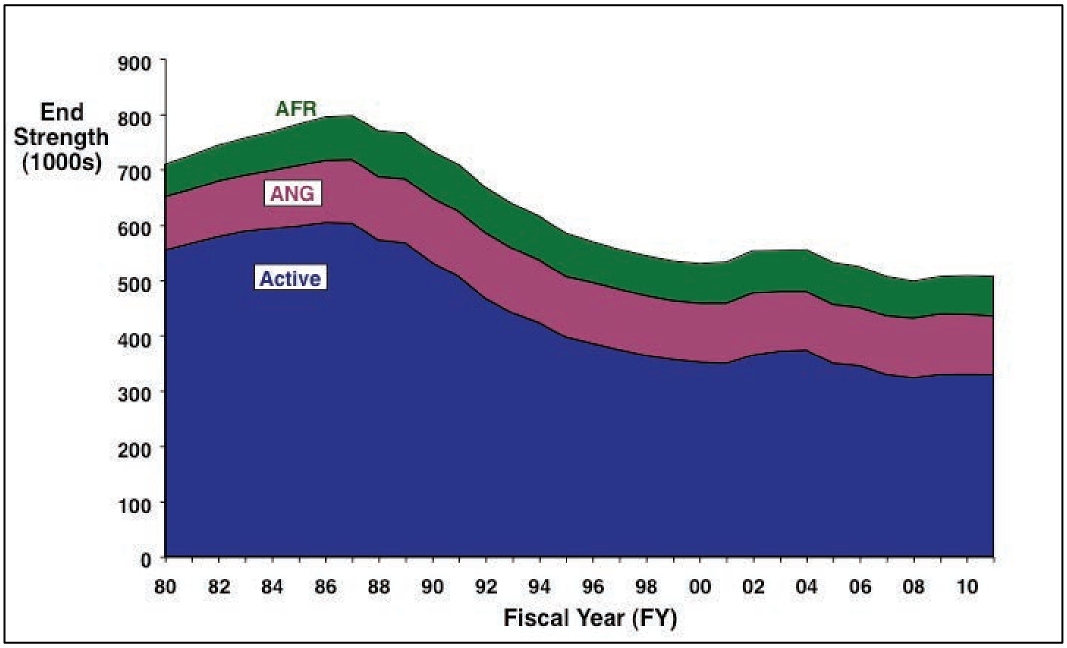


SOURCE: U.S. Air Force, Directorate of Programs, Program Integration Division (2008).
NOTE: Data indicate total active inventory (TAI).

Personnel Strengths

Figure 1.7 shows the end strengths for the AC, ANG, and AFRC from FY1980 to FY2011. The ANG and AFRC data in this figure are *selected reserve* strengths, which include drilling reservists and guardsmen assigned to units, individual mobilization augmentees (IMAs), and two categories of full-time personnel: dual-status or air reserve technicians (ARTs) and active guard and reserve (AGR) members. The data in Figure 1.7 exclude *individual ready reserve* and *retired reserve* members. These data provide a count of reserve military personnel that are routinely engaged in training and ongoing operations; we consider these the best data for depicting changes in the composition of military personnel strengths over time.

Figure 1.7. Military Strengths by Component, FY1980–2011



SOURCES: AC strengths provided by Officer and Enlisted Personnel Management (OEPM), a component of a component of the Office of the Deputy Assistant Secretary of Defense for Military Personnel Policy (DASD MPP); RC strengths provided by the Office of the Principal Deputy Assistant Secretary of Defense for Reserve Affairs (PDASD RA).
NOTES: AC strengths exclude U.S. Air Force Academy cadets. RC strengths are for selected reserve.

Changes in the AC's authorizations have been similar to those in its aircraft inventories. When we compare Figures 1.5 and 1.8, we see that between FY1980 and FY2011, the AC authorizations were reduced by 41 percent, which is similar to the 44 percent reduction in aircraft inventory. The same is not true of the RC. While the ANG's aircraft inventory fell 26 percent, its personnel strength actually increased 10 percent. In the AFR, aircraft inventory was reduced 19 percent, while the number of authorizations increased 21 percent. Had the ANG and AFRC authorizations been reduced in proportion to their aircraft inventories, they would be 34,400 and 23,700 smaller, respectively.

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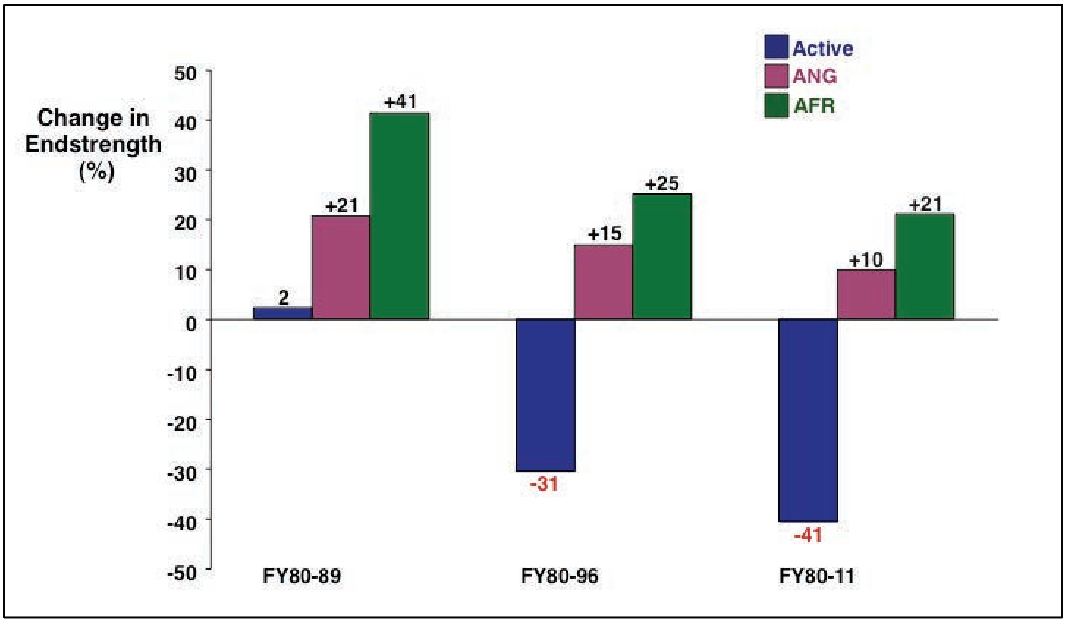
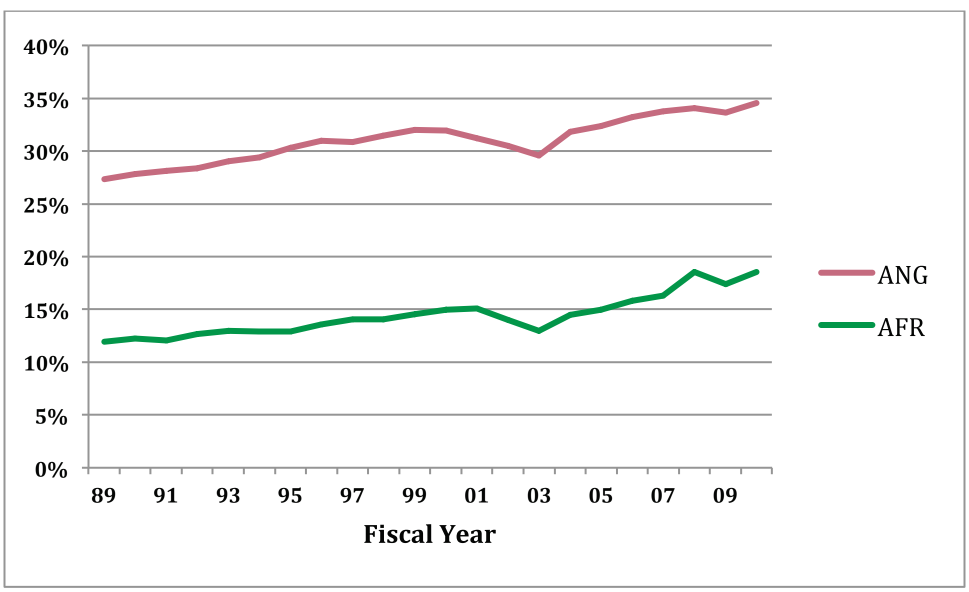
Figure 1.8. Changes in Authorizations by Component, FY1980–2011



SOURCES: AC strengths provided by OEPM; RC strengths provided by PDASD RA.
NOTES: AC strengths exclude U.S. Air Force Academy cadets. RC strengths are for selected reserve.

One striking feature of the RC is the growing proportion of full-time ARTs, dual-status technicians, and AGRs in the selected reserve. Figure 1.9 shows the trend since 1989.

Figure 1.9. Full-Time Reservists and Guardsmen as Proportion of Selected Reserve, FY1989–2010



SOURCE: PDASD RA.

Methodology

While previous research identified multiple considerations that may apply to suitability of missions for the RC, many of the considerations were based on face validity—they appeared to be related logically to such suitability. In the research underlying this report, we sought a stronger empirical base for our recommendations. Our approach was to consider information contrasting AC and RC characteristics on a variety of factors that bear on suitability of mission assignments. From these considerations, we distilled criteria that could be used to weigh the suitability of missions for assignment to the RC. We then applied these criteria to a representative set of missions.

Organization of the Report

Chapter Two provides our review of AC and RC characteristics thought to be important in contemplating the suitability of missions for assignment to the RC. Chapter Three applies the considerations developed in Chapter Two to representative missions.[5] Chapter Four provides our conclusions and recommendations.

[5] An exhaustive analysis of all mission areas would be beyond the scope of the underlying research project.

2. Considerations

In this chapter, we consider a variety of factors that we believe bear on the suitability of missions for assignment to the RC.

First, we look at a series of issues related to the relative availability and cost of AC and RC forces. Factors reviewed here include constraints on availability of RC forces, statutory and funding restrictions on duties of reservists, man-day management, output-related costs, and fleet service life. We link interactions among these factors to three of the criteria we identified for weighing the suitability of missions to the RC:

- **Surge demand:** Force structure is suitably placed in the RC only if there is an anticipated wartime or other episodic surge in demand for forces.
- **Duration of activations:** Missions with shorter activation periods are more suitable for assignment to the RC.
- **Continuation training requirements:** Missions with a pronounced continuation training requirement are more suitable for assignment to the RC.[6]

Next, we look at a series of considerations that each individually form a criterion for weighing suitability.

- **Steady-state deployment demand:** Missions with stress-level deployment demands are less suitable for assignment to the RC.
- **Steady-state home-station operational tempo (optempo):** Missions with high home-station optempos are less suitable for assignment to the RC.
- **Readiness:** Missions would be less suitable for assignment to the RC if readiness could not be maintained at acceptable levels in the RC, but we did not find this to be the case.
- **Absorption and sustainability:** Missions become less suitable for assignment to the RC as the ratio of AC to RC personnel strengths becomes too low to sustain the needed flow of prior-service accessions to the RC.[7] In a related issue, missions in which capacity to absorb inexperienced personnel is a problem (an issue in fighter missions) are less suitable for assignment to the RC.
- **Overseas basing:** Missions with higher ratios of overseas to continental United States (CONUS) requirements are less suitable for assignment to the RC.
- **Civilian competencies:** Missions requiring periodic access to specialized civilian competencies can benefit from assignment to the RC.
- **Relevance to state missions:** Missions that are relevant to the needs of the states are more suitable for assignment to the RC.

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[6] Continuation training is conducted by operational units for the purpose of building and maintaining the operational proficiency of assigned personnel. It is contrasted with formal or lead-in training provided by dedicated training units.

[7] If the ratio of AC to RC becomes too low, the proportion of RC personnel with prior active service will drop. Either a low AC:RC ratio or a low proportion of prior service personnel in the RC would be an indicator that the mission is becoming less suitable for assignment to the RC. The ratio is an indicator of the cause, and the proportion is an indicator of the effect.

Finally, this chapter includes a review of various constructs, such as associations of AC and RC units, that can be used to organize AC and RC forces. We discuss how choice of organizational constructs can enhance or detract from the suitability of a mission for assignment to the RC.

Availability and Cost

Constraints on Availability of Reserve Component Forces

An important shift in expectations that bear on the AC/RC mix is the availability of RC assets—either individuals or units—to meet ongoing contingency operations. As early as 2007, Secretary of Defense Robert Gates began articulating a 1:5 ratio of deployed to dwell time as acceptable for reserve forces (Garramone, 2007). This guidance is now embedded in Air Force policy (AFPD 10-4, para 9.1.2), which also recognizes a 1:2 ratio for AC units as "the maximum sustainable utilization rate while maintaining total Air Force unit readiness . . . " (AFPD 10-4, para 4.1).

Availability of reserve forces for use on active duty is governed statutorily by Title 10 of the U.S. Code. For use as a strategic reserve, i.e., in time of war or national emergency declared by Congress, 10 USC 12301 allows service secretaries or their designated authorities to call individuals or units to active duty for the duration of the war or emergency and for six months thereafter. This provision, combined with the high level of readiness typically found in RC units (Robbert, Williams, and Cook, 1999, pp. 35–45), leads us to consider active and RC forces equally available to meet strategic requirements. In Robbert (2012), we argued that this makes the total force structure (e.g., total of all aircraft of a given type in the AC and RC) the appropriate metric for comparing strategic capacity to strategic demand.

Statutory limits on use as an operational reserve are much tighter:

- Secretaries or their designated authorities, with the consent of governors in the case of National Guard assets, can activate any individual or unit involuntarily for not more than 15 days per year or individuals voluntarily for any period (10 USC 12301).
- In periods of national emergency declared by the President, secretaries or their designated authorities may involuntarily activate units or individuals for 24 months, with a limit of 1,000,000 on active duty at any one time (10 USC 12302).
- For "named operational missions," the President may authorize the Secretary of Defense to involuntarily activate units or individuals for 365 days, with a limit of 200,000 on active duty at any one time (10 USC 12304).
- For "preplanned missions in support of the combatant commands," service secretaries may involuntarily activate units for 365 days, with a limit of 60,000 on active duty at any one time, and with the provision that the mission and its associated manpower and costs are included in defense budget materials (10 USC 12304b).

In practice, the Air Force has seldom used involuntary activation authority as a vehicle for employing RC units operationally. Rather, units are tasked on a volunteer basis to deploy equipment and voluntarily activated individuals, generally on a scale smaller than a full squadron, often with the individual volunteers drawn from several units ("rainbowing") and rotating on a more frequent basis than similarly tasked active duty units. Routine, recurring use of involuntary activation authorities to meet operational demands is untested, and its impact on reserve unit affiliation and retention rates is unknown.

Statutory and Funding Restrictions on Duties of Reservists

Availability of RC assets must be considered in light of statutory restrictions on the employment of ARTs, dual-status technicians, AGRs, and drilling reservists and guardsmen in operational (non-training) duties. With limited exceptions, only AGRs may be used to perform operational duties.

The restrictions on duties of technicians and AGRs are explicit. Per 32 USC 709 (for the ANG) and 10 USC 10216 (for the AFR), the primary duties of technicians must involve organizing, administering, instructing, or training of RC personnel or maintenance of RC equipment. They may provide support to federal operations or missions only if it is incidental to or does not interfere with their primary duties. Use of AGRs is similarly restricted under 10 USC 12310 and 10 USC 101(d)(6)(A).

Restrictions on the use of drilling reservists and guardsmen are not explicit but are rooted in the purposes for which funding of their compensation is appropriated. Per 31 USC 1301(a), appropriated funds may be spent only for the reasons appropriated. Annual appropriations for compensation of RC personnel indicate that the funds must be used for duties specified in 10 USC 12310 (organizing, administering, instructing, and training RC personnel), for some other duties specific to administration of the RC (10 USC 10211, 10305, 8030, and 12402; 32 USC 708 or 502(f)), or "while undergoing reserve training, or while performing drills or equivalent duty or other duty" (see, for example, Title I, Military Personnel, in Public Law 112-10, the Department of Defense and Full-Year Continuing Appropriation Act, 2012).

The effect of these restrictions is that the 39 days of drill reservist time available as monthly drill periods and annual training cannot be used to perform regular and recurring duties that are part of an operational mission. Except for incidental contributions, activity devoted to non-training, operational activities must be performed by AGRs compensated using Military Personnel Appropriation (MPA) man-day funding. Since technicians and AGRs are funded full-time for organizing, administering, instructing, and training of reserve forces, none of their regular full-time employment is available to perform active missions, although technicians can be activated and paid from MPA funds for periods outside of their regular employment (presumably during weekends and periods of leave).

These restrictions are apparently intended to ensure that RC units and individuals receive sufficient training to remain ready for employment when needed. For flying missions in the Air Force, and similarly for combat-arms units in the other services, *continuation training* is an important part of the mission when not deployed or employed operationally. For many flying missions, continuation training is the *primary* mission of the unit while in garrison. The statutory restrictions discussed here seem to have been formulated with these kinds of missions in mind.

But continuation training is not common in non-flying Air Force missions. While personnel in non-flying missions receive various forms of ancillary training, skill upgrade training, and professional military education, these activities are much more limited in their time demands than the continuation training required in flying units. For active duty military personnel on standard 40-hour workweeks, Air Force manpower standards set aside 2.82 hours per month for training and education (AFI 38-201, Table A2.2), or the equivalent of a little over four days per year. Drill reservists and guardsmen presumably need an equivalent four days per year for ancillary training. Of the 39 days per year earmarked by appropriations funding for training of drill reservists and guardsmen, this leaves 35 days per year available for proficiency training in members' Air Force occupational specialties. While some non-flying specialties may require this level of proficiency training, most likely do not, particularly for individuals highly experienced in their specialty. For many such individuals, participation in active missions would often serve to maintain proficiency as well as, if not better than, training activities.

To the extent that these restrictions are faithfully observed, it is difficult to use RC personnel cost-advantageously as part of an integrated team or as a contingent workforce. Commanders would have to ensure that the 39 days of drill and annual training are predominantly devoted to training and make only incidental contributions to operational missions. Accordingly, in our discussion of costs below, examining the fully burdened costs of operational output obtained from RC assets (e.g., activated days spent performing non-training missions), the 39 days are appropriately treated as part of the cost burden to be spread across the activated days. The full costs of technicians and AGRs would also become part of the cost burden on operational output produced by activated drill reservists and guardsmen. These cost burdens significantly elevate the cost of activated days provided by part-time reservists and guardsmen.

A recent memorandum from the office of the Air Force Judge Advocate General (included in this report as Appendix B) discusses these limitations. It mentions the possibility of obtaining legislative relief from the kinds of restrictions discussed in this section, but suggests that such relief would likely be difficult to obtain.[8] Until relief is obtained, the use of RC personnel to perform routine duties or serve as a contingent workforce in many non-deployed, non-flying missions is either legally suspect (using training funds for operational purposes) or unnecessarily expensive (mandating much more training than is needed to be operationally effective).

If Reserve Personnel Appropriation–funded manpower becomes more readily available to meet operational needs, it will likely focus attention on the practice of paying for two drill periods in one day—essentially, two days of pay for one day of work. If monthly Reserve Personnel Appropriation–funded participation in a unit's mission by traditional reservists becomes indistinguishable from MPA-funded participation, the differences in cost between Reserve Personnel Appropriation– and MPA-funded days would be difficult to rationalize. To allow what are now considered drill days to be dedicated to operational duties, this compensation scheme might need to be revisited.

[8] This memorandum discusses the use of technicians, AGRs, and traditional reservists in a specific context (providing force support squadron services across components). Our interest is in using technicians and AGRs more broadly than that. We include the memorandum to document that legislative relief would be useful and has been contemplated.

Man-Day Management

Due to the statutory restrictions discussed above, funding for personnel and other costs of activated RC assets must come from regular military appropriations rather than from funding earmarked for the RC. Personnel costs, specifically, must be paid from Military Personnel Appropriation (MPA) accounts rather than from Reserve Personnel Appropriation accounts. Most MPA costs, including personnel costs for AGRs, are paid from a central Air Force–level account rather than from allocations to the major commands (MAJCOMs). To manage this process, the Air Force determines the total amount of MPA funding to be used for AGRs and then, using standard composite compensation rates, determines the total number of activated reservist days (referred to as *MPA man-days*) that can be supported. The MPA man-days are then allocated to MAJCOMs and other users through some assessment of their relative needs (AFI 36-2619).

Drilling reservists and guardsmen serving one weekend per month and two weeks per year are paid from the Reserve Personnel Appropriation account. Some personnel require training above this basic amount to remain current in their career fields (e.g., pilots). These additional days are also covered using Reserve Personnel Appropriation funds.

There are two types of MPA man-days—those funded by overseas contingency operation (OCO) funding and those termed steady-state and funded from the current-year MPA account. Steady-state man-days are the traditional method for employing the RC for active duty needs. Prior to FY2012, resourcing for MAJCOMs' man-day requirements was based on historical utilization and execution of the prior year's inputs. The system did not, therefore, identify the true need, did not prioritize across the Air Force, and did not account for emerging requirements. Also prior to FY2012, the Directorate of Manpower, Organization and Resources (AF/A1M) was the sole authority for distribution and execution of MPA man-days.

Beginning in FY2012, the Air Force shifted to a requirements-based process for steady-state man-days utilizing the Air Force Corporate Structure. The FY2012 Program Objective Memorandum process institutionalized a requirements-based procedure, whereby the MAJCOMs work closely with combatant commanders to identify MPA man-day requirements. Once submitted, these requirements are staffed, verified, and vetted through the Air Force Corporate Structure based on established priorities published in the Air Force's Annual Planning and Programming Guidance (APPG). Additional criteria, such as mission impact, critical skills, active duty manning, and level of support, are also weighed to finalize the prioritization. Appendix A provides more detail regarding this process.

OCO man-days are funded by supplemental appropriations and are, as of this writing, used only for Operation Enduring Freedom (OEF) and post–Operation New Dawn/Iraq activities. Although the Directorate of Operational Panning, Policy and Strategy (AF/A5X) reviews the OCO man-day requests, there is no prioritization scheme for these man-days. Post-9/11, RC personnel funded through supplemental appropriations were mobilized. As the authority to mobilize expired, volunteers continued to serve in these contingencies. The Air Force continues to restrict the use of these OCO man-days, and it is the expected loss of supplemental funding that is driving proposed changes to overall man-day funding methods.

Figure 2.1 shows MPA steady-state and OCO man-years by fiscal year (left axis) as well as the corresponding size of the AC and RC (right axis). The figures shows that the Air Force utilized almost 40,000 man-years in FY2002 and 15,000 to 20,000 man-years per year during the past decade, with those MPA man-years expanding its active strength by about 10 percent in the FY2002 peak and 5 percent in more recent years. Figure 2.2 shows the corresponding costs.

Figure 2.1. MPA Man-Years, by Fiscal Year and AC/RC End Strength

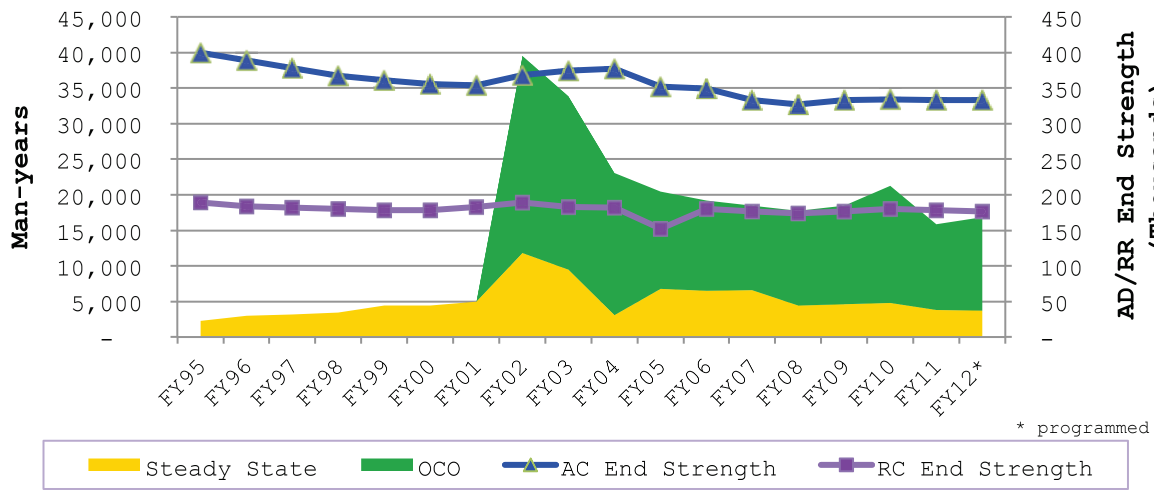
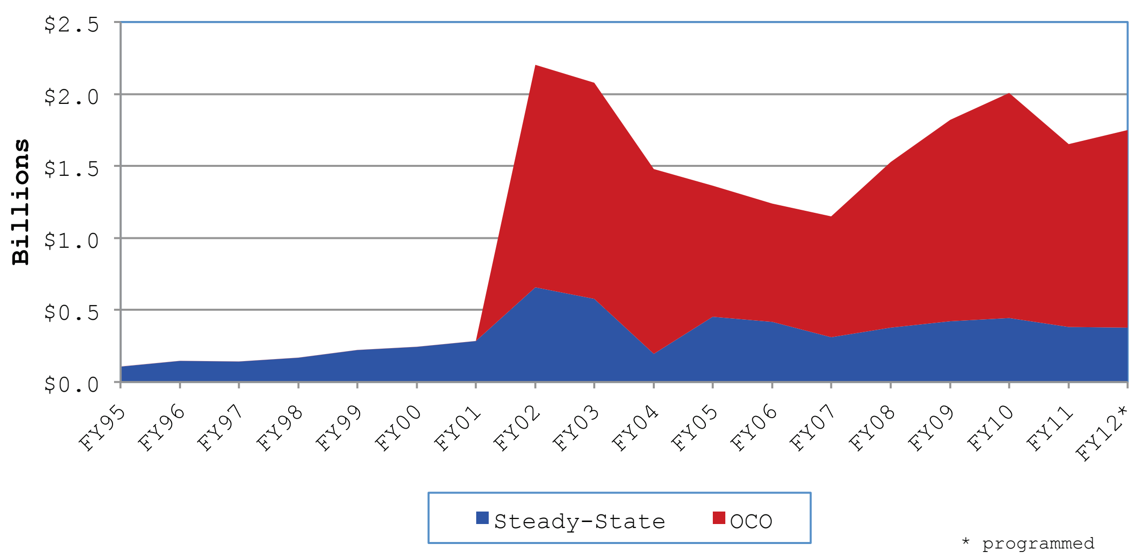


Figure 2.2. Man-Day Costs



An Evolving Management Process

Appendix A describes a new process recently implemented to more rigorously derive man-day requirements and distribute man-days to users. The appendix also contains the perspectives of users and summaries of recent (FY2009–2011) man-day usage. We concluded from our review of the process that, although it is improving, it likely continues to place avoidable and possibly inefficient limits on utilization of the RC. More flexibility in funding and allocating man-days would likely make more missions suitable for assignment to the RC. Our detailed observations are also contained in the appendix.

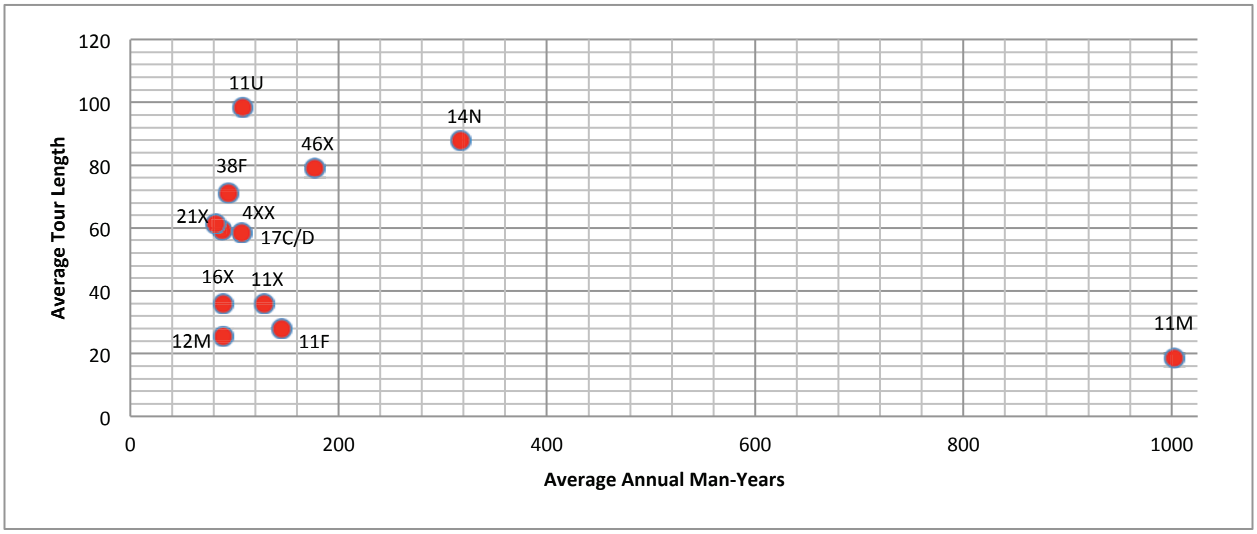
Our main concern is that steady-state man-day funding may be well below the level needed to exploit the RC as an operational reserve and to take advantage of lower flying-hour costs that are sometimes available in the RC. The current FY2012 programmed number of man-years is approximately 16,900, of which 13,100 (78 percent) is funded through OCO. The concern is that the growth in steady-state MPA requirements is masked by supplemental funding. When OCO funding is reduced, missions that rely on MPA man-days may be at risk unless the steady-state operational demand is reduced along with OCO reductions.

Identifying Potential Reserve Component Missions Based on Man-Day Usage

To identify functional areas that might be considered for RC participation, we reviewed the average annual number of man-days by Air Force Specialty Code (AFSC) and the average tour length. Figure 2.3 shows the top 12 officer 3-digit AFSCs with the greatest number of average annual man-years plotted against the average tour length for those man-years, and Figure 2.4 shows the same for the top 20 enlisted 2-digit AFSCs.

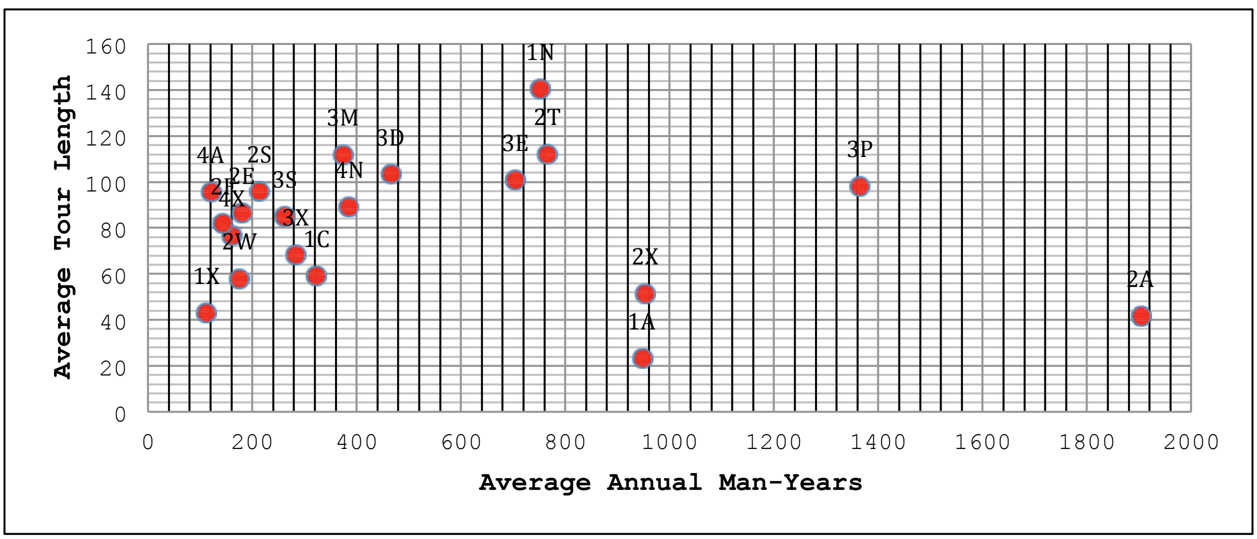
Missions with a high number of man-days and a low average tour length (lower right quadrant of the figures) are better candidates for shifting the mix more toward the RC. High total numbers of man-days indicate heavier operational demand. Shorter tour lengths indicate missions that are compatible with the part-time status of traditional reservists and guardsmen.

Figure 2.3. Top 12 Officer AFSCs: Average Annual Man-Years Versus Average Tour Length (FY2009–2011)



NOTE: Career field designations are 11F – Fighter Pilot, 11M – Mobility Pilot, 11U – RPA Pilot, 11X – Other Pilot, 12M – Mobility Combat Systems Operator, 14N – Intelligence, 16X – Operations Support, 17C/D – Cyber Operations, 21X – Maintenance, 38F – Force Support, 4XX – Medical, 46X – Nurse.

Figure 2.4. Top 20 Enlisted AFSCs: Average Annual Man-Years versus Average Tour Length (FY2009–2011)



NOTE: Career field designations are 1A –Aircrew, 1N – Intelligence, 1X – Other Operations, 2A – Aerospace Maintenance, 2F – Fuels, 2S – Materiel Management, 2T – Transportation/Vehicle Maintenance, 2W – Munitions and Weapons, 2X – Other Logistics, 3D – Cyberspace Support, 3E- Civil Engineering, 3M – Services, 3P – Security Forces, 3S – Mission Support, 3X – Other Support, 4A – Health Services/Medical Materiel/Biomedical Equipment, 4N – Aerospace Medicine/Surgical Services; 4X – Other Medical.

Figures 2.5 and 2.6 show the average number of man-years by functional area for one- and two-day tours. Mobility operations (pilots, enlisted aircrew, and maintenance) make up the highest number of one- and two-day tours. A significant number of these tours are also served by generalist/fighter pilots.

Figure 2.5. Top Officer AFSCs: One- and Two-Day Man-Day Tours (FY2009–2011)

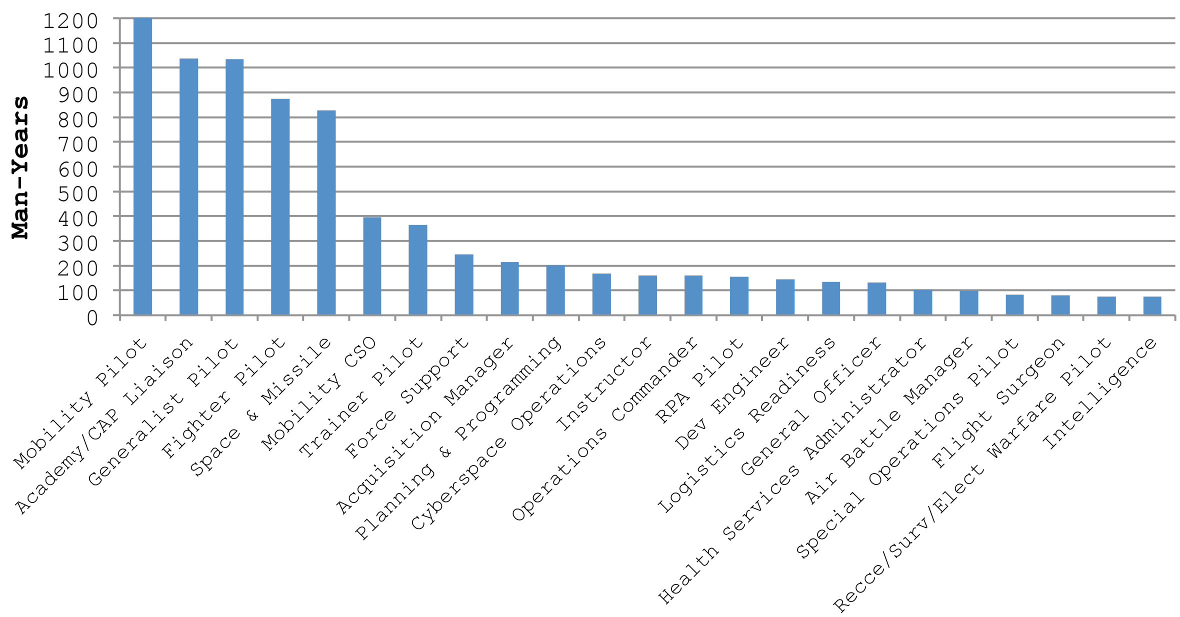
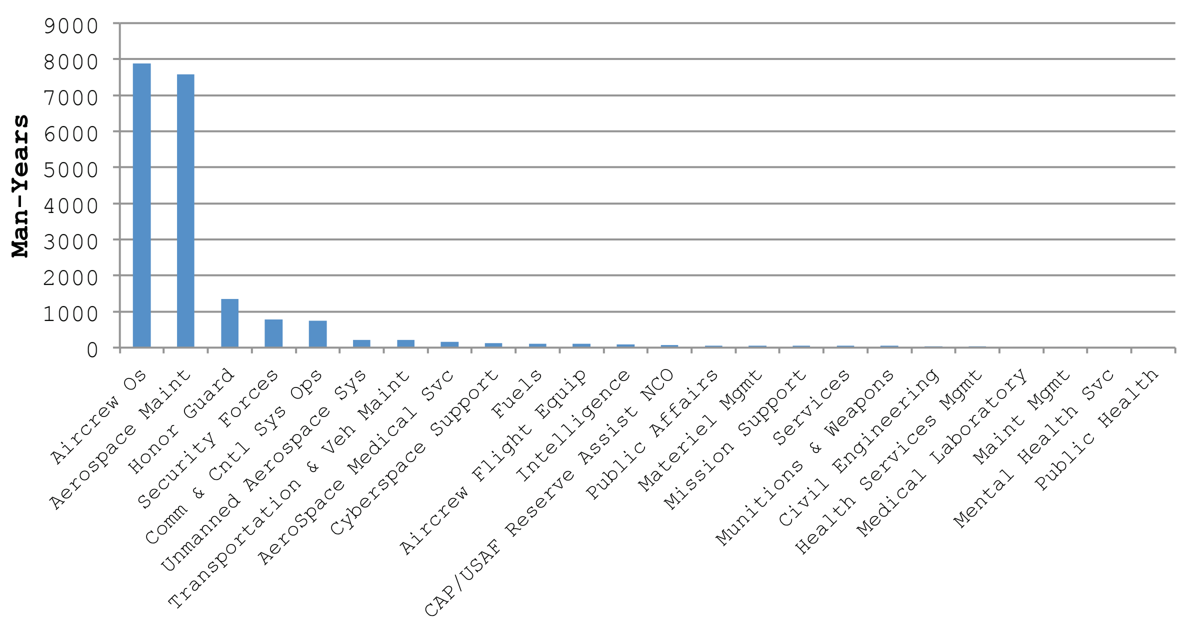


Figure 2.6. Top Enlisted AFSCs: One- and Two-Day Man-Day Tours (FY2009–2011)



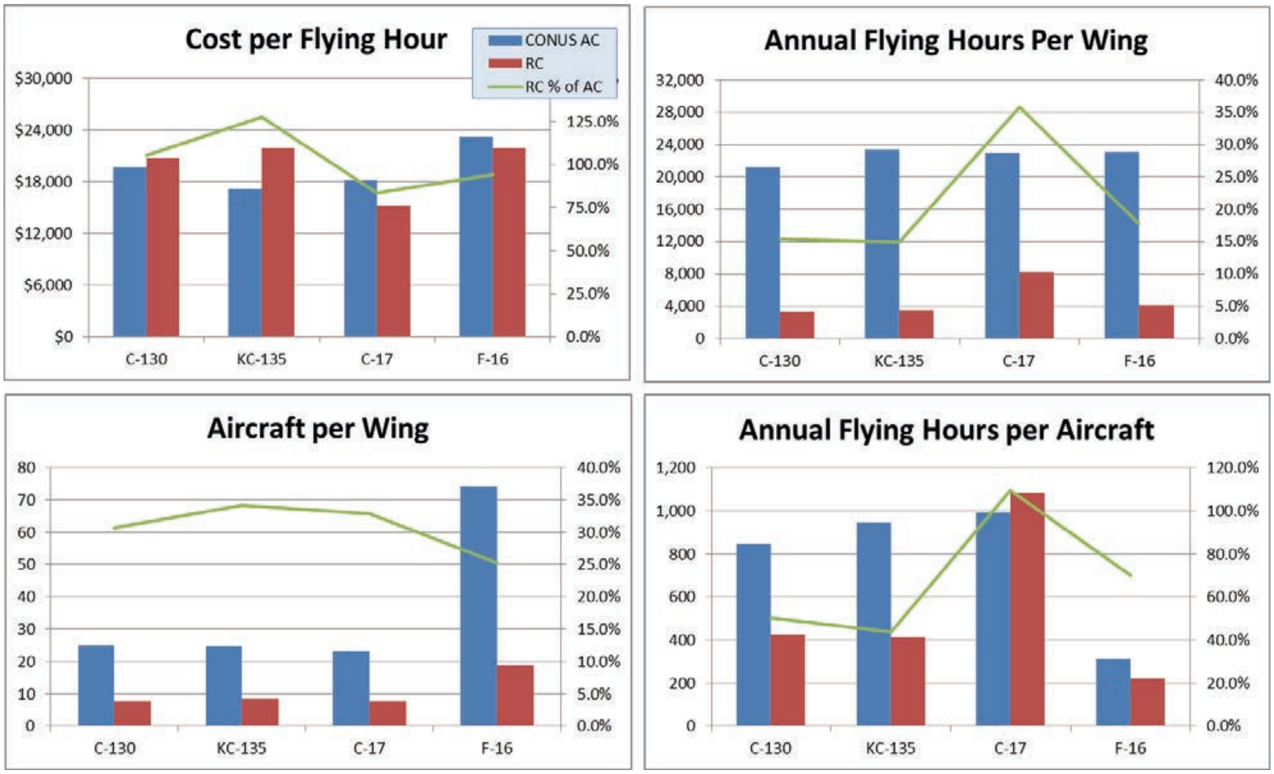
Output-Related Costs

Flying Missions

Robbert (2012) analyzed costs incurred by wing or equivalent organizations operating three weapon systems—F-16s, C-130s, and KC-135s—from 2006 to 2010. Costs included fully loaded personnel costs, operations and maintenance expenses, a proportionate share of local base support costs, man-day costs, and the costs of pipeline training for assigned personnel. Costs were determined for three kinds of output: owned aircraft, flying hours, and operational (as opposed to continuation training) flying hours. The work revealed that reserve units have lower aircraft ownership costs, primarily due to flying the aircraft less intensively. Average flying-hour costs were found to be in similar ranges for AC and RC units. Looking beyond the averages, Robbert found a scale effect in flying-hour costs: Larger, CONUS-based AC units with high total flying-hour output tend to operate at lower costs per flying hour than smaller RC units with low total flying-hour output. In two of the three fleets (F-16s and KC-135s), he also found that AC units, relative to RC units, tend to fly a much higher proportion of their hours as operational, resulting in lower costs per operational flying hour.

The generally smaller scale of RC units does not seem to have affected all missions equally. Robbert (2012) measured scale in terms of the number of flying hours per year generated by a wing. As indicated in Figure 2.7, among the four missions examined, the KC-135 exhibited the greatest difference between components in cost per flying hour (upper left panel) and also had the greatest difference in scale (upper right panel). Scale, as Robbert measured it, is a function of the number of aircraft in a wing and the number of annual flying hours per aircraft. In the latter measure (lower right panel), RC KC-135s wings had the greatest difference from AC wings. While strong conclusions cannot be drawn from these limited comparisons, the data suggest that missions in which the RC can increase the scale of operations are more suitable for assignment to the RC. Scale of operations can be increased by concentrating the number of available aircraft in fewer wings and by increasing annual flying hours per aircraft (primarily by increasing utilization of aircraft and crews for operational missions).

Figure 2.7. Scale Effects in Costs per Flying Hour



NOTE: Data are for FY2006–2010. C-17 data include transportation working capital fund (TWCF) flying hours.

When RC units fly a markedly lower proportion of their hours as operational, each increment of force structure placed in the RC increases the total flying hours needed to meet operational demands. In the KC-135 fleet, for example, AC units were found to have flown about 75 percent of their hours as operational, while RC units flew about 50 percent of their hours as operational. If 100 percent of the fleet were in the AC (holding total fleet size constant), total flying hours would have been considerably less.[9] Having a proportion of this fleet in the RC increased operations and maintenance costs and accelerated aging of the fleet. Accordingly, we observe that missions in which the RC typically differs widely from the AC's proportion of hours flown as operational are less suitable for assignment to the RC. Table 2.1 shows these differences, by flying mission, for missions with equipped units in both the AC and RC, with those exhibiting the greatest differences in proportion of hours flown as operational at the top of the list. In general, missions at the top of the list are less suitable for assignment to the RC. They become more suitable if greater utilization of RC units for operational missions can be obtained.

[9] At these rates, AC units fly 1.33 total hours (operational hours plus training hours) to yield one operational hour, while RC units fly two total hours to yield one operational hour. Expected total flying hours for the fleet is the sum of operational hours tasked to AC units multiplied by 1.33 plus the sum of operational hours tasked to RC units multiplied by 2. If the fleet were 100 percent in the AC, the multiplier would be 1.33 for all operational hours.

Table 2.1. Proportion of Hours Flown as Operational by Equipped Units, FY2006–2010

Mission	AC Flying Hours	AC Proportion Operational	RC Flying Hours	RC Proportion Operational	AC Prop Minus RC Prop
MQ-1	615,594	93.8%	1,531	0.0%	93.8%
C-32	11,086	79.3%	8,364	3.0%	76.2%
KC-135	557,563	76.5%	426,582	48.7%	27.8%
C-130	370,730	66.0%	492,769	50.0%	15.9%
B-52	77,876	16.1%	14,088	2.9%	13.2%
F-16	658,833	34.2%	510,645	23.2%	11.1%
C-5	81,274	89.9%	111,217	80.5%	9.4%
F-15	546,382	24.4%	113,323	15.3%	9.1%
HH-60	71,056	39.2%	34,518	31.2%	8.1%
EC-130	49,642	73.8%	16,613	67.4%	6.4%
C-17	592,129	83.9%	81,694	83.9%	0.0%
A-10	263,802	24.9%	148,086	28.0%	-3.1%
OA-10	71,541	17.8%	19,895	22.6%	-4.8%
C-21	82,693	58.7%	28,927	67.5%	-8.8%
HC-130	24,366	14.6%	19,237	27.6%	-13.0%
C-40	17,203	64.6%	13,133	86.3%	-21.7%
MC-130	80,572	34.9%	18,392	71.3%	-36.4%

SOURCE: Air Force Total Ownership Cost (AFTOC) AFTOC data provided by the Air Force Deputy Assistant Secretary for Cost and Economics (SAF/FMC).
NOTE: Data excludes units with dedicated training or developmental missions.

Table 2.2 lists flying missions for which there were no independently equipped RC units in the period we examined (FY2006–2010). The units are listed in descending order of the proportion of hours flown as operational. Since RC units are, under many circumstances, unable to achieve high rates of operational flying, missions near the top of this list may be less suitable for assignment to the RC.

Table 2.2. Proportion of Hours Flown as Operational by Active Component Units, FY2006–2010 (No Corresponding Equipped Reserve Component Units)

Mission	Flying Hours	Proportion Operational
RQ-4	30,307	93.4%
QF-4	4,897	88.1%
C-37	38,044	88.1%
MC-12	42,030	84.9%
KC-10	260,599	79.9%
U-2	71,841	78.5%
VC-25	2,912	78.4%
MQ-9	60,826	78.2%
C-12	16,913	75.7%
RC-135	75,461	73.2%
AC-130	61,965	64.8%
E-4	8,463	63.1%
C-20	23,636	58.8%
B-1	110,555	55.3%
OC-135	3,777	52.7%
MH-53	17,771	51.4%
WC-135	2,685	48.5%
E-3	86,655	41.9%
CV-22	6,729	41.2%
UH-1	73,051	25.5%
B-2	29,413	13.4%
TU-2	5,123	2.2%
F-117	21,412	1.6%
T-38	47,783	0.6%
TC-130	2,006	0.4%
TC-135	10,411	0.2%

SOURCE: AFTOC data provided by SAF/FMC.

Finally, for completeness, Table 2.3 lists missions in which all operational equipment was assigned to the RC. The table illustrates that, under some circumstances, RC units can generate a high proportion of their flying hours as operational.

Table 2.3. Proportion of Hours Flown as Operational by Reserve Component Units, FY 2006–2010 (No Corresponding Equipped Active Component Units)

Mission	Flying Hours	Proportion Operational
RC-26	39,690	95.3%
C-26	1,507	87.2%
C-38	4,435	82.7%
LC-130	23,323	77.7%
E-8	65,207	76.1%
C-9	4,136	51.4%

SOURCE: AFTOC data provided by SAF/FMC.

Non-Flying Missions

For non-flying missions, we generally lack the measurable outputs that allowed us, as in the case of flying missions, to compare the costs of outputs generated by larger and more operationally intensive AC units with those generated by smaller and less operationally intensive RC units.[10] For many non-flying missions, the only measurable unit of output available for analysis is a person-day of labor.

Table 2.4 compares the costs of active officer and enlisted person-days with those of drill reservists and guardsmen, determined using standard composite compensation rates and man-hour availability factors. Using these factors alone, a part-time RC workforce would appear to be more expensive than a full-time AC workforce to cover a steady-state person-day requirement. These comparisons do not consider differences in installation support, training pipeline costs, or other factors that might be expected to make fully loaded RC costs appear more favorable, and which are likely to vary considerably among missions and locations. They also do not consider potential differences in productivity, with greater experience levels enhancing RC productivity and the discontinuities involved in dividing work up over a larger, part-time workforce detracting from RC productivity. The comparisons suggest, however, that using a part-time RC workforce to cover a steady-state requirement is unlikely to be cost-advantageous. A part-time workforce's cost advantage would lie primarily in its capacity to meet labor demands that surge either seasonally or randomly. We conclude that missions without surge requirements are, on a cost basis, less suitable for assignment to the RC.

[10] In the case of flying missions, measures included owned aircraft, flying hours, operational flying hours, and combatant command (COCOM)-tasked aircraft-days.

Table 2.4. Comparison of Active and Reserve Component Person-Day Costs

	Officer			Enlisted		
	Active	ANG	AFR	Active	ANG	AFR
Standard annual composite compensation rate[a]	$150,879	$37,583	$40,149	$77,807	$13,763	$16,675
Monthly man-hour availability	149.6[b]	25.0[c]	25.0[c]	149.6[b]	25.0[c]	25.0[c]
Annual man-hour availability	1,795.2	300.1	300.1	1,795.2	300.1	300.1
Cost per hour	$84	$125	$134	$43	$46	$56
Cost per day	$672	$1,002	$1,070	$347	$367	$444

NOTES:

a. FY2011 rates from AFI 65-503, Tables 19.1, 22-1, and 23.1.

b. For normal 40-hour week, from AFI 38-201, Table A3.1. Nonavailability for primary duties is calculated using factors for holidays, leave, PCS, medical, organizational duties, and education and training.

c. (Two drill days per month * 8 hours) + (15 annual training days per year * 8 hours/12 months), reduced by 3.8 percent to account for nonavailability for primary duties due to organizational duties and education and training (same rate as active duty nonavailability for these two factors).

As discussed above, applying the drill and annual training days of reservists and guardsmen to operational (non-training) missions is problematic. Strict adherence to the applicable restrictions can add considerably to the cost of using RC forces operationally.

Fleet Service Life

Several factors combine to determine the length of time that an aircraft may remain in service before fatigue elevates the risk of component failure to an unacceptable level (Pyles, 2003, pp. 33–34). While the aging rate varies depending on the load spectra and flight envelopes to which aircraft are exposed, the primary driver of aging toward expected service life is the number of flying hours accumulated on the aircraft. Reducing annual flying hours yields longer service lives.

Robbert (2012) observed that flying hours in various missions can be segregated into operational and continuation training categories. Operational flying hours can be viewed as an exogenous demand that is unaffected by the AC/RC mix of aircraft in a fleet. Annual training hours per aircraft, however, may vary between AC and RC units, such that the AC/RC mix can affect service life. The picture is complicated by the fact that operational hours can be used to satisfy some training requirements. The analyses reported here reflect how aircraft have been operated during a recent period (FY 2006–2010), but the ratio of operational to training hours is not fixed, and thus a different distribution of operational demand between AC and RC units could produce different results.

Using data developed for Robbert (2012), we can compare the training hours per aircraft in AC and RC fleets for several types of aircraft. Table 2.5 provides the relevant comparisons. In the F-16 and C-130 fleets, RC units had fewer annual continuation training hours per airframe (PMAI) and aircrew than AC units. As a result, the total fleet required fewer flying hours than would have been the case if had been entirely within the AC. The force composition helped to extend the service life of the fleet.

Table 2.5. Average Annual Flying Hours per Airframe and Aircrew, FY2006–2010

	PMAI	Crew Ratio	Flying Hours Operational	Flying Hours Training	Flying Hours per PMAI Operational	Flying Hours per PMAI Training	Flying Hours per Aircrew[e] Operational	Flying Hours per Aircrew[e] Training
F-16								
AC[a]	275	1.25	38,230	51,454	317	187	139	150
RC[b]	300	1.25	16,668	49,523	221	165	56	132
C-130								
AC	99	2.25	54,441	25,660	550	259	244	115
RC	192	2.00	44,774	36,858	233	192	116	95
KC-135								
AC w/o Assoc[c]	23	1.75	20,197	4,506	891	199	509	114
AC with Assoc	76	1.25	55,621	13,080	728	171	583	137
Classic Assoc	–	0.75	2,664	4,596	35	60	47	80
AFRC[d]	50	1.75	7,846	13,381	157	267	90	153
ANG[d]	153	1.80	33,900	28,645	222	187	123	104
C-17								
AC w/o Assoc	8	4.5	5,424	1,663	703	215	156	48
AC with Assoc	124	3	102,827	18,581	830	150	277	50
Classic Assoc	–	1.5	38,144	10,642	308	86	205	57
RC	15	4.5	13,707	2,632	897	172	199	38

SOURCE: Robbert, 2012, and related analyses.
NOTES:
a. Excludes Kunsan and Osan units, which have atypical operations vs. training hours distributions.
b. Excludes Fresno unit, which has atypical operations vs. training hours distribution.
c. Excludes Kadena and Mildenhall units, which have atypical operations vs. training hours distributions.
d. AFRC and ANG data shown separately because crew ratios are different.
e. Based on standard crew ratios.

In the KC-135 and C-17 fleets, the prevalence of classic associate units makes the analysis more complex.[11] In the KC-135 fleet, AC hosts and their classic associates consumed 171 and 60 training hours, respectively, per year per airframe. Their total of 231 training hours per year per airframe is greater than the 199 training hours per year per airframe of the sole CONUS AC unit that has no associate. However, the host-plus-associate units also have a higher combined crew ratio than the unit with no associate, providing greater potential capacity. The training hours consumed by the independently equipped AFRC and ANG units were at opposite ends of the spectrum, with AFRC units consuming more training hours per airframe and aircrew than the AC, and classic associate units and ANG units consuming less. Accordingly, AFRC units tend to shorten expected service life of the fleet, while ANG units tend to extend it. The sharp

[11] See discussion of associate unit types under the heading "Associate Units" below.

differences between these operating characteristics of AFRC and ANG units warrants further examination.

In the C-17 fleet, equipped RC units flew less training per airframe and aircrew than either the AC unit with no associate or the AC units with classic associates. Accordingly, placing part of the fleet in the RC contributed to a longer expected service life for the fleet. The classic associate units, however, may not be beneficial if they continue to operate the way we observed in FY2006–2010. Active and classic associate units consumed a combined 236 training hours per year per airframe, which is greater than the 215 training hours per year per airframe in the one AC unit with no associate or the 172 training hours per year in the equipped RC units. In the C-17 fleets, the crew ratio for combined host and associate units is the same as that of units without associates. If the associate units had not existed and their aircrew complements were placed instead in their host units, and if the host units could have operated with the same consumption of training hours per airframe as the one non-host AC unit, fewer total flying hours would have been consumed and the service life of the fleet would have been extended.

The data would seem to argue for replacing classic associate units with equipped RC units (with a corresponding shift of aircraft from the AC to the RC). A countering concern, however, would be reduced access to the aircraft for active missions. Additionally, the associate units may have a beneficial impact on RC affiliation of separating AC pilots and maintainers.

Other Considerations

Stress Related to Deployment and Home-Station Operational Tempos

Given DoD policy setting desired limits on deploy-to-dwell ratios of 1:2 and 1:5 for AC and RC forces, respectively (Gates, 2007, pp. 1–2; AFPD 10-4), we would ideally examine how closely various communities have approached these limits. Deployment, in this context, refers to time in theater to support combatant commander requirements (AFOD 10-4, p. 12). Missions would be most suitable for assignment to the RC when RC and AC units are not near these limits. When units are near these limits, stress can be reduced on both components by shifting force structure from the RC to the AC.[12]

We found, however, that measuring deploy-to-dwell ratios is not clear-cut, particularly in the Air Force. Deploy-to-dwell ratio limits in the Gates (2007) memorandum have variously been interpreted as applying to individuals and to units. Air Combat Command (ACC) officials have told us, for example, that RC fighter units are asked to fill deployment taskings whenever all AC fighter units have reached the 1:2 ratio. But combatant commander taskings often call for deployments at less than full squadron strength. In ACC's unit scheduling approach, deployment of six aircraft from a squadron counts the same as deployment of a full squadron in unit-level deploy-to-dwell ratios. By this accounting, when units are at a 1:2 ratio, individuals assigned to

[12] Consider, for example, a mission that is met by five AC units at a 1:2 deploy-to-dwell ratio and five RC units at a 1:5 ratio. In a six-year period, the five AC units are deployed for two years each and the five RC units are deployed for one year each, for a total of 15 deployed unit-years and 45 dwell unit-years. If all units were in the AC, the deployed and dwell unit-years would be spread across ten units equally, yielding a deploy-to-dwell ratio of 1:3.

the units are likely at a lower ratio, and individuals in the affected career fields but not immediately assigned to deployable units are at even lower ratios.

We also heard from Air Force officials at both Air Staff and MAJCOM levels that standard practice is to express individual-level deploy to dwell ratios, with only immediately deployable personnel included in the dwell side of the ratio. They indicated that, since each functional manager will have a different approach to categorizing individuals as immediately deployable, each functional manager would calculate his or her own deploy-to-dwell ratio.[13]

For this analysis, we had no access to compiled unit-level deployment data and no clear basis for determining non-deployable personnel. We were thus unable to produce deploy-to-dwell ratios that conform to current practice. To depict which missions might be bordering on deployment stress, we instead adopted an approach that measures the proportions of time that various populations spent in deployments in support of combatant commander taskings.[14] The data we captured extends from 2002 to 2011, encompassing a decade of relatively heavy deployment demands. Deployment data used in this analysis were compiled from Air Force active pay files, reserve pay files, contingency management files, and other sources obtained from the Defense Manpower Data Center (DMDC).[15,16,17] We calculated these proportions by Air Force specialties, which correspond roughly to various missions. We also calculated these proportions, in specific missions, for operational units. If all individuals were in deployable units and all individuals were continuously eligible for deployment, a ratio of 1:2 would imply that the population spent 33.3 percent of its time deployed, and, similarly, a ratio of 1:5 would imply that the population spent 16.7 percent of its time deployed. To account generously for non-deployable personnel, we reasoned that deployment demands at roughly a third of these levels might be considered stressful. We thus looked for AC career fields with deployment demand at or above 11.1 percent of total strength and RC career fields at or above 5.6 percent. The officer and enlisted specialties exceeding these thresholds are listed in Tables 2.6 and 2.7. Deployment percentages exceeding the 11.1 and 5.6 percent thresholds are shaded gray.

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[13] The Personnel Readiness Division (AF/A1PR) within the Air Staff's Directorate of Force Management Policy maintains a database, the Functional Area Manager Analysis and Sourcing Tool (FAST), derived from the OSD Deliberate and Crisis Action Planning and Execution Segments (DCAPES) system and accessible by functional managers for this purpose. The database is not publicly available.

[14] The proportion of time spent deployed is readily converted to a rough deploy-to-dwell ratio. The dwell figure in a deploy:dwell ratio is equal to (1 – % time deployed)/(% time deployed). We retained percentage time deployed figures rather than converting to a deploy:dwell to avoid giving the impression that we have applied either the unit-level or non-deployable personnel data required to compute deploy:dwell according to current Air Force practice.

[15] RAND compiles and maintains this data set for all military services for continuing use in any research related to contingency deployments.

[16] The analysis also required mapping personnel records to unit attributes. Personnel Accounting Symbol (PAS) hierarchies, as represented in PASTREE files, were used to link wings with their subordinate groups and squadrons. Information about host and associate units was obtained from AF/A8XF. Unit-to-MDS (mission design series) data associations were made based on the unit and MDS pairs used in Robbert (2012).

[17] DMDC-based indications of deployment are at the month level of detail. Our analysis converted the monthly data to daily data. A TDY tracking file provided by the Air Force Personnel Center was used to estimate the number of days deployed in the first or last month of a deployment. Otherwise, the actual number of days in a deployment month was used.

Table 2.6. Officer Career Fields with Potential Deployment Stress, FY2002–2011

Specialty		Active		ANG		AFRC	
		Avg Pop	% Deployed	Avg Pop	% Deployed	Avg Pop	% Deployed
11M	Mobility Pilot	3,652	18.2	1,756	6.6	1,815	9.3
16F	Regional Affairs Strategist	226	15.8	0	0.0	38	1.9
12M	Mobility Cmbt Sys Off	544	14.5	334	7.7	179	7.3
12S	Special Ops Cmbt Sys Off	509	14.8	3	4.0	49	11.5
46F	Flight Nurse	184	13.9	270	5.2	532	3.8
11T	Tanker Pilot (obsolete)	265	19.3	168	7.1	115	9.4
11R	Recce/Surv/EW Pilot	747	13.2	136	7.4	98	3.3
11S	Special Ops Pilot	768	13.0	2	3.7	70	7.5
11A	Airlift Pilot (obsolete)	605	18.0	250	10.4	362	13.0
32E	Civil Engineer	1,302	12.8	491	4.2	433	2.8
31P	Security Forces	794	12.3	142	5.3	188	4.6
12R	Recce/Surv/EW Cmbt Sys Off	803	11.7	94	7.1	48	4.1
13D	Combat Rescue	146	11.1	22	6.3	22	6.3
11H	Rescue Pilot	446	10.5	63	6.2	54	7.1
12A	Airlift Nav (obsolete)	136	14.7	95	11.2	52	5.7
71S	Special Investigations	370	10.1	0	16.7	163	1.6

SOURCE: DMDC.
NOTE: Aggregations are based on duty Air Force specialty code (DAFSC).

Table 2.7. Enlisted Career Fields with Potential Deployment Stress, FY2002–2011

Specialty		Active Avg Pop	Active % Deployed	ANG Avg Pop	ANG % Deployed	AFRC Avg Pop	AFRC % Deployed
8P10	Courier	125	22.4			14	3.1
8D00	Strategic Debriefer	46	19.5			14	1.9
1A21	Loadmaster	2,225	18.7	977	9.6	1,236	13.1
1A71	Aerial Gunner	381	16.8	30	4.8	23	7.3
1C41	Tactical Air Control Party	1,093	16.9	303	6.2	1	0.0
3E81	Explosive Ordnance Disposal	1,175	15.0	92	5.0	192	5.1
1A01	In-flight Refueling	734	14.7	440	4.1	298	5.1
1A11	Flight Engineer	1,523	14.9	518	9.4	694	10.8
8M00	Postal	601	14.9			10	0.0
2T11	Vehicle Operations	2,443	14.1	788	5.0	395	5.1
1A61	Flight Attendant	201	13.3	25	13.9	18	5.4
1W02	Special Operations Weather	32	11.8	9	6.7		
3E21	Pavements & Constr Equip	1,747	13.0	886	5.3	553	4.0
2T31	Vehicle Mgt & Analysis	1,704	12.2	514	2.4	148	0.9
3P01	Security Forces	24,749	12.3	6,861	5.1	4,060	3.7
2T21	Air Transportation	4,552	11.9	1,773	3.4	5,943	3.6
6C01	Contracting	1,255	11.5	330	1.1	38	1.1
2T01	Traffic Management	1,823	11.5	597	1.5	339	0.6
3E31	Structural	1,668	11.4	753	4.9	496	2.9
1A31	Airborne Mission Systems	1,246	10.1	115	6.9	60	6.2
3D17	Cable & Antenna Systems	116	9.2	123	6.9		
1C21	Combat Control	492	9.2	35	6.1	3	1.7
1A81	Airborne Crypto Language Anal	1,365	8.9	79	5.2	28	4.9
1A41	Airborne Operations	858	9.2	24	13.5	36	5.7
1T21	Pararescue	500	8.4	98	6.0	105	5.2

SOURCE: DMDC.
NOTE: Aggregations are based on control Air Force specialty code (CAFSC).

These tables indicate that specialties that have been most stressed tend to be engaged in some aspect of flying operations. Vehicle operations, security forces, civil engineering, and contracting are also represented in these lists. Notably absent are fighter pilot and any aircraft maintenance specialties.

For personnel assigned within operational units, deployment demands are likely to be greater than for Air Force–wide populations. We identified the wings operating four aircraft types—C-130s, C-17s, KC-135s, and F-16s—and drilled down to the deployment experience of personnel assigned to those wings. As indicated in Table 2.8, the operations communities in the mobility wings, most notably in the C-17 units (see rates shaded in gray), experienced the heaviest deployment stresses.

Table 2.8. Deployment Rates in Operational Wings for Selected Flying Missions, FY2002–2011

	Active		ANG		AFRC	
Workforce	**Avg Pop**	**% Deployed**	**Avg Pop**	**% Deployed**	**Avg Pop**	**% Deployed**
C-130						
Operations	833	17.1	1,828	9.0	858	7.9
Maintenance	1,313	6.9	3,508	4.9	1,988	3.7
Other	83	12.1	388	4.1	212	3.8
C-17						
Operations	2,263	28.5	106	20.2	1,569	14.5
Maintenance	6,792	6.8	396	2.8	3,377	1.0
Other	384	6.7	46	5.4	290	2.1
KC-135						
Operations	856	18.3	1,438	4.1	568	5.7
Maintenance	3,880	7.9	5,117	2.0	1,970	1.4
Other	230	6.7	373	2.4	193	1.8
F-16						
Operations	1,093	7.9	570	3.4	192	3.3
Maintenance	8,612	5.2	5,344	3.1	1,240	2.9
Other	845	3.9	352	3.2	75	2.0

Table 2.9 drills down further to the operations communities (aircrews) in the active C-17 wings. Over the ten-year span we examined, two AC wings (Dover, at 33 percent deployed, and Charleston, at 35 percent deployed) clearly reached or exceeded a 1:2 deploy-to-dwell ratio, while two RC wings (the Charleston AFRC associate unit, at 17.2 percent, and the Jackson ANG unit, at 20.2 percent) reached or exceeded a 1:5 ratio (see rates shaded in gray). Others may have also reached these thresholds, depending on how many non-deployable personnel were assigned over that period.

Table 2.9. Deployment Rates Among Aircrews in C-17 Wings, FY 2002–2011

	Active		ANG		AFRC	
Base	**Avg Pop**	**% Deployed**	**Avg Pop**	**% Deployed**	**Avg Pop**	**% Deployed**
Charleston AFB, SC	575	35.4			359	17.2
Dover AFB, DE	404	33.1			312	14.7
Elmendorf AFB, AK	162	10.0				
Hickam AFB, HI	76	7.6				
McChord AFB, WA	518	28.8			404	15.0
McGuire AFB, NJ	141	20.7			135	6.6
Travis AFB, CA	386	27.9			332	13.9
Jackson-Evers, MS			106	20.2		
March AFB, CA					26	14.4

Readiness

In this section, we discuss readiness: how well prepared a unit is to perform its intended military functions. "Readiness depends on the unit's access to resources (personnel and equipment) and to processes (training and maintenance) needed to keep the resources combat-ready" (Robbert, Williams, and Cook, 1999, p. 35). The suitability of assigning missions to the RC depends on the ability of RC units to maintain their readiness.

Deployments

The best way to measure readiness is performance during operational missions. While there are no direct metrics to measure performance in actual operations, there are indirect measures. These indirect measures include expeditionary wing commander comments on performance and whether there is a difference in types of units requested by component commanders. We are unaware of any cases in Operation Noble Eagle, Operation Iraqi Freedom (OIF), or OEF where either of these indirect measures indicates a readiness difference between AC and RC forces.

Inspections

The main method used by the Air Force to measure readiness has been the readiness inspection (RI).[18] RIs evaluate and measure the ability of units to perform their conventional wartime, contingency, or force sustainment missions (AFI 90-201, p. 36). All RIs inspect four areas: initial response, employment, mission support, and ability to survive and operate (ATSO).[19] In addition, the Inspector General (IG) team gives an overall grade of passing (outstanding, excellent, or satisfactory) or failing (marginal or unsatisfactory). Figure 2.8 indicates RI results for Air Mobility Command (AMC) and AMC-gained units from 2004 through 2012. During this time, AMC/IG conducted 155 total RIs. The AC passed 97.7 percent (42 of 43) of its inspections, the AFRC passed 98.3 percent (57 of 58) of its inspections, and the ANG passed 100 percent (54 of 54) of its inspections. Thus, from an overall perspective of satisfactory versus not satisfactory measure, there is no difference between the AC and the RC. The chart below provides a more detailed look at the RI results. The ANG had the highest average ratings for employment, mission support, ATSO, and overall. The AC had the highest average rating for initial response. AFRC had the lowest average rating in all categories.

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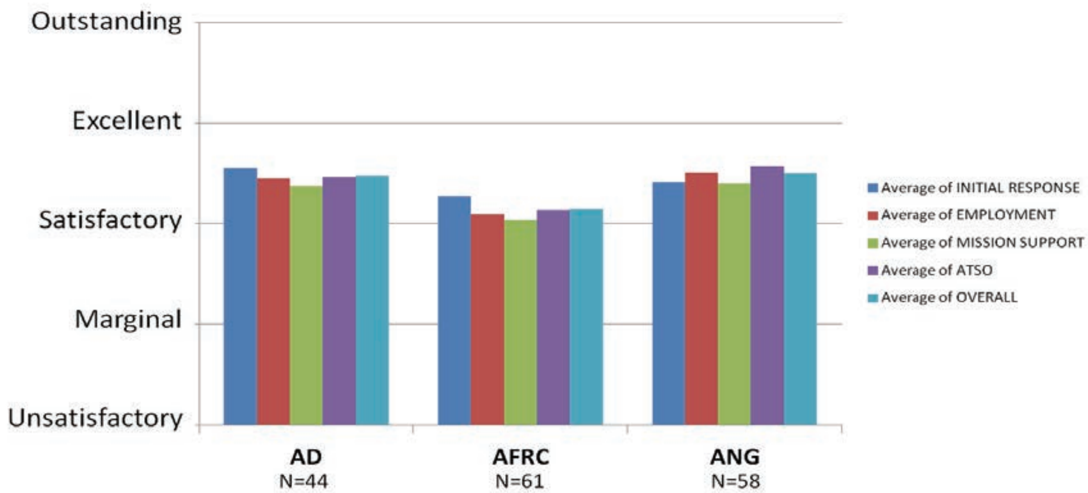
[18] Prior to a March 23, 2012, version of AFI 90-201, these inspections were referred to as *operational readiness inspections* (ORIs).

[19] These are the major graded areas in use prior to the March 23, 2012, version of AFI 90-201—the period from which we have available inspection results. The similar major graded areas in the current version of AFI 90-201 are positioning the force; employing the force; sustaining the force; and ATSO in a hostile and/or contaminated chemical, biological, radiological, and nuclear environment.

Figure 2.8. Average Air Mobility Command Readiness Inspection Ratings, 2004–2012



SOURCE: AMC, Office of the Inspector General.

The following data, provided by the ACC Inspector General (ACC/IG), cover ACC and ACC-gained units from 2010 through the third quarter of 2012. During this time, ACC/IG conducted 35 total RIs. Twenty-eight of the 35, or 80 percent, resulted in overall passing grades (satisfactory, excellent, or outstanding). The failures (marginal or unsatisfactory) consisted of two AC (out of 12 RIs, or 17 percent), three ANG (out of 19 RIs, or 19 percent), and two AFRC (out of three, or 67 percent) units (Givens, 2012). Notably, six of the seven failures were wholly due to maintenance. The percentages of passing grades are similar for the AC (83 percent) and the ANG (81 percent) units. The AFRC passing rate was only 33 percent, but due to the small number of units inspected, this rate cannot be considered representative.

The RI data indicate no appreciable difference between the AC and the ANG for either AMC or ACC units. The RI specific-area rating data suggest a minor difference in readiness for AFRC units in AMC, though AFRC units have a similar overall passing rate to AC and ANG units.

Underlying Factors

The three underlying factors identified by Robbert, Williams, and Cook (1999) that explain the RC "readiness parity" with the AC still hold true in today's total force. First, RC personnel typically have much more experience in their aircraft type than an equivalent AC counterpart. Second, RC personnel achieve the same combat-ready status as AC personnel with fewer training sorties. Third, RC units go through the same pre-deployment spin-up as AC units.

Experience

In August 2012, the 357th Fighter Squadron from Davis-Monthan AFB, Arizona, won Hawgsmoke, "a biennial worldwide A-10 bombing/tactical gunnery competition as a replacement for the discontinued 'Gunsmoke' competition" (Kagarise, 2012). This was the first time since the competition began in 2000 that an AC squadron won the competition. Even though the AC has maintained approximately 50 percent of the A-10 forces, its units have won this head-to-head gunnery competition only once in the last seven competitions. One explanation is the greater average experience levels in RC units. Of the 28 U.S. pilots who have achieved 4,000 hours in the F-16, 23 have reached this mark while serving in the RC, and of the five who have reached 5,000 hours, all reached this mark while in the RC. As an example, Table 2.10 shows the average experience levels for pilots in an AC squadron (55th Fighter Squadron) and an RC squadron (120th Fighter Squadron).

Table 2.10. Pilot Experience Levels in Typical AC and RC F-16 Units

	Component	Average Flight Hours	Instructor Pilots
120th Fighter Sq Buckley AFB, CO	ANG	2466	61%
55th Fighter Sq Shaw AFB, SC	AC	1349	26%

SOURCE: Air Force Personnel Center data as of July 2012.

This increased experience level in the RC is due to multiple factors. First, many RC pilots joined the RC after flying for multiple years in the AC. As of September 2011, 62 percent of RC fighter pilots had previously served for a minimum of eight years in the AC.[20] Second, while AC pilots typically alternate between flying and staff assignments after the rank of captain, RC pilots tend to remain flying throughout their careers. These extra flying hours also translate into more flying leadership opportunities, more instructors, and uniformly more combat experience in the RC than in the AC. Table 2.11 shows the experience levels for the F-16 unit at Buckley AFB, Colorado, as of July 2012.

Table 2.11. 120th Fighter Squadron (ANG) Experience Levels, July 2012 (34 Total Pilots)

Experienced	Flight Lead Qualified	4-Ship Flight Lead Qualified	Instructor Pilots	Percentage Previously Deployed to OIF/OEF	Average OIF/OEF Deployments per Pilot
100%	100%	94%	61%	94%	2.14

SOURCE: Air Force Personnel Center data as of July 2012, and 120th Fighter Squadron Letter of Xs, July 2012.

Training

An AC squadron must closely balance the requirement to upgrade pilots (wingmen to flight leads, flight leads to instructors) with the continuation-training requirement for pilots not in an upgrade program. The typical RC squadron does not face this challenge. As seen in Table 2.12, RC pilots are typically so experienced that the vast majority of their flying is for continuation training. The Directorate of Training at ACC, with the ACC commander’s approval, dictates the minimum number of sorties required to maintain combat readiness, referred to as being combat mission ready (CMR). This minimum requirement is issued to units in a Ready Aircrew Program (RAP) tasking message for each type of aircraft. Table 2.12 shows these requirements for AC

[20] Derived from Air Force personnel files on hand in RAND archives.

and RC units flying the F-16 Block 50/52. Experienced AFRC pilots are able to maintain their CMR status with 25 percent fewer sorties than their AC counterparts, and experienced ANG pilots are able to maintain their CMR status with 29 percent fewer sorties than their AC counterparts. The greater training flexibility and the overall greater experience levels discussed earlier allow the RC to maintain CMR status in fewer sorties than is required for the AC.

Table 2.12. Ready Aircrew Program Annual Training Missions (F-16 Blk 50-52)

	CMR Sorties	
Component	**Inexperienced**	**Experienced**
AC	108	96
AFRC	108	72
ANG	92	68

SOURCE: ACC RAP tasking messages for October 1, 2011.
NOTE: Experienced pilots are those who exceed an established flying hour threshold that varies by MDS.

Operational Readiness Spin-Up

All units in the combat air forces go through the same AEF spin-up cycle in preparation for a combat deployment. All units are required to "participate in AEF spin-up events (e.g. large force exercises: RED FLAG, GREEN FLAG, or EAGLE FLAG) prior to deployment" (AFPD 10-4). GREEN FLAG focuses on close air support and integration with ground forces. This exercise is flown out of Barksdale AFB, Louisiana, for GREEN FLAG East, and out of Nellis AFB, Nevada, with sorties over Ft Irwin, California, for GREEN FLAG West. RED FLAG focuses on training for high intensity air-to-air employment, and is run out of Nellis AFB, with sorties flown on the Nellis Test and Training ranges. These training exercises occur approximately four to six months before the scheduled AEF deployment. Thus for AEF rotations, such as have occurred for the last ten years in OIF and OEF, the pre-deployment training for AC and RC units are nearly identical.

Summary of Readiness Observations

We found no indications that deployed expeditionary commanders, for either air or ground forces, differentiate between AC and RC air forces. RIs for both ACC- and AMC-gained forces indicate there are no appreciable readiness differences. Although training requirements are different, both AC and RC forces achieve the required combat flying training to maintain CMR status. Finally, both AC and RC forces accomplish identical pre-deployment spin-up training. Thus, for pre-planned deployments, all readiness measures indicate there is no substantial difference in readiness between AC and RC forces.

For no-notice deployments, this readiness similarity may not hold. RC units include both full-time and part-time pilots and maintainers. Before 9/11, about 40 percent of pilots in an ANG unit were typically full-time. Since 9/11 and the establishment of the air sovereignty alert (ASA) mission, this percentage has changed to approximately 60 percent full-time to cover this alert mission.[21] Though the number of sorties required to meet CMR differs between AC and RC pilots, full-time RC pilots fly at frequencies similar to AC pilots. The other roughly 40 percent maintain their minimum sortie requirements, but do not fly as frequently as AC pilots. For pre-planned deployments, this inconsistency is negated because the part-time pilots who participate in the deployment fly the same intense spin-up training schedule as the full-time pilots. For no-notice deployments, one would not expect any readiness differences between AC pilots and full-time RC pilots, but one would be prudent to expect some minor readiness differences between AC and part-time RC pilots.

Absorption and Sustainment

Absorption and sustainability are the principal processes that determine the size and suitability of AC and RC pilot inventories. *Absorption* is the process of controlling the flow of new pilots into operational units. This flow should be constrained so that overall experience levels in operational units remain at acceptable levels. *Sustainment* in this context refers to the capacity to build inventories of pilots large enough to meet AC and RC requirements through a combination of new-pilot absorption and affiliation of separating AC pilots in the RC. Appendix D provides a description of these processes, the factors that govern them, and analyses suggesting ways that AC and RC interactions can be mutually beneficial.

To maintain both healthy units and sufficient total pilot inventories, feasible absorption rates must equal or exceed required sustainment rates. As indicated in Appendix D, this has been problematic in the fighter community but not in other aircraft communities. Since AC units have far greater absorption capacities than RC units, a first-order conclusion would be that fighter force structure should be shifted from the RC to the AC until a suitable absorption capacity is reached. Our analysis, however, suggests that active associate units and either small classic associate or IMA cells in active units can be used in concert to produce acceptable absorption and sustainment rates that approximately meet requirements. These associations would place inexperienced AC pilots in RC units, where experience levels are well above needs, and to a lesser extent place experienced RC pilots in AC units to reduce overall AC pilot requirements. As a result, required pilot inventories can be sustained while retaining cost-saving AC/RC force structure distributions.

Overseas Basing

Some missions require a substantial portion of the available force structure to be permanently based outside CONUS. The RC can contribute to overseas basing in Alaska, Hawaii, and Puerto Rico, but permanent basing at other overseas locations is, conventionally, provided using only AC force structure. Since overseas assignments are of limited duration (DoDI 1315.18), overseas force structure requires a CONUS rotation base of units operating and maintaining similar equipment. The Air Force goal is to provide a rotation base such that airmen serve no more than eight involuntary years overseas in a 20-year career (AFI 38-204, p. 19). By inference, any

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[21] For example, the 120th Fighter Squadron at Buckley AFB has 34 assigned or attached pilots. Twenty-one are full-time pilots (six of those pilots are full-time due to an ongoing ASA commitment), and 13 are part-time.

mission that is more than 40 percent overseas-based could conflict with this goal. Table 2.13 shows the proportion of force structure based overseas for various missions. Missions with over 40 percent of the active fleet overseas-based are shaded in gray.

Officials at the Air Force Personnel Center report that missions with a high proportion of the active fleet based overseas present some assignment challenges. Some aircrew members must be assigned to consecutive overseas tours, and there are reduced opportunities for consecutive cockpit assignments when rotating from overseas back to the CONUS. However, rotation to other systems (such as to Air Education and Training Command trainer cockpits or to staff duties) make the challenges manageable. For enlisted maintenance workforces, among AFSCs tied to the missions in Table 2.13, none are designated as CONUS/overseas imbalanced, indicating that problems, if any, are not sufficient to warrant special programs to alleviate excessive overseas assignments.[22] Accordingly, we conclude that missions appearing high on Table 2.13 are guardedly suitable for assignment to the RC.

[22] CONUS/overseas imbalanced AFSCs are identified on an enlisted Retraining Advisory list, available on the Air Force's myPers website (https://gum-crm.csd.disa.mil/app/landing), to which access is limited to personnel with Air Force affiliations.

Table 2.13. Proportions of Flying Missions at Overseas Locations

	Total Force		AC		
Mission	Fleet Size[a]	% Overseas[b]	Fleet Size[a]	% of Total Force Fleet	% Overseas
C-12	23	91.3	23	100.0	91.3
F-22	169	37.4	155	91.7	28.4
F-15	238	31.5	108	45.4	69.4
F-15E	206	27.2	206	100.0	27.2
MC-130	77	23.4	65	84.4	27.7
F-16	953	23.0	521	54.7	42.0
HH-60	98	22.8	66	67.3	22.7
C-20	10	20.0	10	100.0	20.0
C-37	11	18.2	11	100.0	18.2
C-40	11	18.2	4	36.4	50.0
C-21	48	16.7	27	56.3	29.6
HC-130	33	13.8	19	57.6	0.0
KC-135	414	13.7	167	40.3	19.8
A-10	339	13.6	183	54.0	25.1
C-130	366	12.6	127	34.7	20.5
E-3	32	12.5	32	100.0	12.5
C-17	216	7.9	182	84.3	9.3
UH-1	74	5.4	74	100.0	5.4

SOURCE: Logistics, Installations, and Mission Support Enterprise View (LIMS-EV) as of July 31, 2012.
NOTES:
a. Excludes developmental aircraft.
b. Excludes RC aircraft in Alaska and Hawaii.

Special Competencies

Some missions can be enhanced by engaging reservists and guardsmen in military duties that match or complement their civilian occupations. Their full-time civilian work minimizes the training required to stay proficient in their part-time military duties. RC pilots who are also airline pilots and RC civil engineering specialists who work full-time in construction trades are prime examples. More importantly, in some cases, transfers of technology and specialized human capital from other sectors to the military may be facilitated. The cyber community offers such promise.

Summary of Suitability Criteria

From the considerations discussed above, we derived the ten criteria, listed at the beginning of this chapter, that can be used to weigh the suitability of a mission for assignment to the RC.

Surge Demand

Cost studies have demonstrated that placing force structure in the RC can reduce costs. But, because RC units have less capacity than AC units to meet ongoing operational demands due to deploy-to-dwell limitations, force structure should be placed in the RC only if the operating capacity of the fleet, if placed fully in the AC, would exceed steady-state operational demands. If strategically sized, a fleet will have a capacity greater than steady-state operational demands only if there are surge or post-surge planning scenarios that require it. Additionally, in our discussion of cost considerations for non-flying missions as well as our earlier work (Robbert, 2012) on the costs of flying missions, we demonstrated that a part-time RC workforce is generally more costly than a full-time AC workforce for meeting steady-state operational requirements. Thus, missions with episodic surges or post-surge demands (whether or not the surges in demand are related to wartime contingencies) that exceed steady-state demands are likely to be suitably and cost-advantageously assigned to the RC, whereas those with no such demands tend to be unsuitable.

Duration of Activations

The capacity of RC units to contribute to steady-state demands is greater when those contributions can be made during relatively brief periods of activation, consistent with what would be expected from a part-time workforce, particularly if voluntary activation is the primary means of accessing that workforce. Missions in which short-duration activations are prevalent are thus more suitable for assignment to the RC than missions characterized by longer activations or deployments.

Continuation Training Requirements

Given statutory and appropriations constraints that require technicians, AGRs, and the baseline participation of drill reservists and guardsmen to be dedicated primarily to training, missions that have a continuation training requirement seem most suited to assignment to the RC. Missions with no continuation training requirement are problematic for assignment to the RC because statutory and funding constraints either inflate costs and fleet service life consumption or require legally suspect workarounds.

Steady-State Deployment Demand

RC units and individuals generally are less available than AC units and individuals for meeting deployment demands. As those demands reach stress levels, the mission becomes less suitable for assignment to the RC.

Steady-State Home-Station Operational Tempo

In some missions, particularly mobility missions, steady-state demand for operations from home station may drive high optempos. RC units and individuals generally are less available than AC units and individuals for meeting high optempo demands. As those demands reach stress levels, the mission becomes less suitable for assignment to the RC.

Readiness

We found no evidence of RC units in any mission being less ready than their AC counterparts. Thus, while readiness is an important consideration, we find all missions we evaluated suitable on this criterion.

Absorption and Sustainment

RC units have limited capacity to develop their own non-prior-service assets. When the ratio of RC to AC force structure becomes too high, the flow of prior service assets from the AC to the RC will not be sufficient. Accordingly, missions that are very sparely represented in the AC are not good candidates for assignment to the RC. Missions in which the ratio of AC to RC personnel strengths are already low are not good candidates for additional mission assignment to the RC.

Robbert, Williams, and Cook (1999) found that the ANG and AFRC had different preferences for the proportion of their accessions filled using personnel with prior active service. They estimated that, for fighter missions, sustainability of pilot requirements would be adequate with AC pilot strengths that are 1.9 to 3.3 times greater than RC pilot strengths and AC force structure that is 1.4 to 2.5 times greater than RC force structure. For our evaluation in this document, we generalize on these earlier results, using an AC/RC personnel strength ratio of less than 2:1 as somewhat unsuitable and less than 1:1 as very unsuitable.

For pilot career fields, sustainability is closely related to the capacity of operational units to absorb new pilots. The absorption capacity of AC units far exceeds that of RC units. Accordingly, missions in which absorption capacity is a problem (as is currently the case in fighter missions) are less suitable for assignment to the RC. However, if cost or other considerations compel an RC role in absorption-challenged missions, carefully tailored associate units can elevate absorption to required sustainment levels.

Overseas Basing

Permanent basing of RC assets outside of U.S. territory would be incompatible with part-time, community-based RC workforces. Accordingly, missions with higher ratios of overseas to CONUS requirements are less suitable for assignment to the RC.

Civilian Competencies

Missions with some very specialized human capital demands can benefit from skills developed in civilian occupations by part-time reservists and guardsmen. Missions with this characteristic can benefit from RC participation, although statutory and appropriations provisions that require extensive training duties make it costly to derive this benefit.

Relevance to State Missions

For the ANG, missions that are relevant to needs of the various states are more suitable than missions with no such relevance.

Organizational Constructs

RC units and individuals routinely trained and available for activation or mobilization are commonly organized in three ways: as independently equipped units, as associate units, and as IMAs.[23] Each organizational construct has its own costs and benefits. In this section, we discuss how the choice of organizational construct can enhance or detract from the suitability of a mission for assignment to the RC.

Equipped Units

Equipped units are by far the most common of the three constructs.[24] Some 27 AFRC and 79 ANG wings or groups are independently equipped with fighter, mobility, or other flying-mission force structure. Smaller numbers of other RC wings are independently organized to provide force structure for non-flying missions.

Equipped units are well suited to the role of maintaining force structure at minimal cost as a strategic reserve. As demonstrated in Robbert (2012), however, it should not be assumed that cost can always be reduced by shifting a mission to independently equipped RC units. In any mission, as a function of how operational demands relate to efficient capacity of the available fleet, costs can be minimized and fleet service life maximized by finding an appropriate distribution of force structure between AC and RC units.

Associate Units

Many operational units host an *associate* unit. Associate units have their own assigned personnel and their own budgets, but no assigned aircraft or other assets. Instead, they maintain and operate the assets owned by the host unit. In *classic* associations, the host unit is an active wing and the associate unit is a RC wing. However, in *active* associations, the host unit is an RC wing and the associate unit is an active squadron or element. In *air reserve component* associations, both host and associate units are in the RC.

Classic associations are very common in mobility and training missions, less common in fighter missions, and also found in some non-flying missions, such as Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers (RED HORSE) units and air or space operations centers. Robbert (2012) demonstrated that, in three fleets (F-16s, C-130s, and KC-135s), classic associate units look very much like independently equipped RC units in terms of the proportion of hours flown as operational, overall flying hour costs, and operational flying-hour costs. Classic associate units have the potential to increase the utilization of available equipment and increase the scale of operations of the units to which they are associated while avoiding aircraft ownership costs that are linked to the number of aircraft owned by a unit rather

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[23] AFPD 10-3, AFPD 90-10, and AFI 90-1001 define these organizational constructs, including the types of associate units described below. They also define several less common variants, including *fully integrated, integrated associate,* and *hybrid associate* units.

[24] Conventionally, such units are referred to as "unit equipped." See para. 2, AFPD 10-3.

than the number of flying hours produced.[25] However, as indicated above in the section on fleet service life, actual results obtained in associate units are mixed.

At least two factors reduce the potential economies available from the use of classic associate units. First, as discussed in the Statutory Restrictions section above, associate units must use their drill and active training days primarily for training rather than for meeting operational mission demands. Second, classic associate units provide not just operational and maintenance capabilities, but also a second wing structure that parallels that of the host wing. The associate wing structure is operationally unnecessary, because there is no need in either surge scenarios or ongoing contingencies to mobilize and deploy RC wings. The parallel wing is also administratively unnecessary. Oversight and coordination of flying, maintenance, and other activities are best discharged with a single rather than parallel wing, group, and squadron functions. Personnel management of reservists and guardsmen may require special expertise, but this can be provided with something much more modest than a parallel organizational structure.[26]

Active associate units are much fewer in number than classic associate units. They exist predominantly in flying missions, although there are two RED HORSE active associate units. Active associate units typically provide a squadron or smaller element to augment the host RC wing, with administrative control of the AC squadron or element exercised by a geographically separate operational AC wing. We can visualize at least three potential benefits from active associate units. First, they potentially increase the aircraft utilization and scale of operations of the units to which they are associated, thereby reducing the unit's average cost per flying hour. Second, they provide additional pilot absorption capacity, the need for which is discussed elsewhere in this report. Third, they make it easier for the Air Force to access RC equipment for operational deployment, thereby reducing stress on AC units.

Air reserve component associations are rare. Only two such units currently exist—a KC-135 unit at Tinker AFB and a C-130 unit at Niagara Falls Air Reserve Station. The benefits of these associations would appear to be similar to those of unassociated equipped RC units. But they induce inefficiencies through parallel organizational structures that duplicate many overhead and support functions.

Individual Mobilization Augmentees

IMAs are members of the selected reserve who are "assigned to a Reserve component (RC) billet in an active component or non-DoD organization . . . to support mobilization (pre- and/or post-mobilization) requirements, contingency operations, operations other than war, or other

[25] Robbert (2012) linked variable costs of flying units to the number of flying hours produced by each unit. It is also possible to depict variable costs as a function of both flying hours and the number of owned aircraft. Viewed in this way, it can be seen that a specified number of flying hours in a unit owning fewer aircraft would generally cost less than the same number of flying hours produced by a unit owning more aircraft.

[26] We recognize that streamlining of the management structure of combined host and associate units would likely reduce leadership opportunities for traditional drilling reservists, because part-time leadership of units manned with large proportions of full-timers would be difficult. To occupy leadership positions, traditional reservists might need to transition to full-time. Short of that, additional analysis would be required to determine whether affording leadership opportunities to traditional reservists provides a sufficient benefit to offset the cost of a parallel organizational structure.

specialized or technical requirements" (DODI 1235.11). Because IMAs are assigned to AC units, they are found in AFRC but not in the ANG. As indicated in Table 2.14, IMAs constitute about 12 percent of AFRC's selected reserve strength.

Table 2.14. Air Force Reserve Command Selected Reserve Strengths

Category	Count	% of Total
Traditional reservists and guardsmen	49,228	68.9
IMAs	8,780	12.3
ARTs	10,500	14.7
AGRs	2,992	4.2
Total	71,500	

SOURCE: Air Force Reserve, "Reserve Categories," web page, accessed downloaded Aug 22, 2012.

Compared with either equipped or associate units, IMAs offer the potential for a much greater integration of AC and RC personnel pursuing a common mission. This form of RC augmentation is particularly attractive for missions that are personnel-intensive rather than equipment-intensive or for which independent equipage of RC units is infeasible or inefficient (e.g., space assets, communications networks). It provides unity of command and a more natural alignment of workers to supervisors while minimizing duplicative organizational overhead. It allows for relatively seamless augmentation of in-place AC workforces to meet surges in mission demands. Sneed and Kilmer (2012) find that conventional practice emphasizes the role of the IMA as maintaining readiness to serve as a strategic backfill rather than serving as an operational resource, but they believe that the pertinent Air Force regulation (AFI 38-201) provides sufficient flexibility for the role to evolve, and they encourage it. As with other forms of reserve service, however, we find that use of IMAs for operational purposes is hampered by statutory and appropriations language mandating that Reserve Personnel Appropriation funding and full-time manpower should be devoted primarily to training or RC administration.

To successfully attract reservists to serve in an expanded IMA workforce, reasonable opportunities for promotion and career progression must exist. Since command or supervisory responsibilities of units with predominantly full-time manpower are difficult, or even impossible, to discharge while serving as a traditional part-time reservist, IMAs would have to transition to full-time service in order to assume some senior positions. To allow for this, statutory restrictions on use of technicians and AGRs would have to be relaxed so that IMAs could transition to those forms of reserve service when selected for leadership positions within predominantly AC units, or IMAs could be called to statutory tours of duty under 10 USC 12301(d).

Sponsored Reserves

The concept of sponsored reserves (SR) was introduced by the United Kingdom Ministry of Defense in the UK's Reserve Forces Act 1996 (United Kingdom Defense Forum, 2003). The concept consists of an agreement between a military service and a provider of contract services that the contractor would make membership in a reserve status a condition of employment for some critical parts of the servicing workforce. This might serve several purposes. It could guarantee continued availability, through mobilization of the sponsored reservists, of a critical workforce under conditions of increasing personal risk, austerity, contractor business failure, or other similar developments. It could increase the availability of a critical workforce for deployment. It could alter the combatant status of a workforce. In general, it would reduce the risks to a mission that depends critically on the availability of contracted services.

The UK has implemented this concept for a variety of missions, including:

- RAF's Mobile Meteorological Unit
- Engineering support to the BAe 125 aircraft
- The Army's Heavy Equipment Transporter (HET) program awarded to Halliburton, Brown and Root
- The Royal Navy's Strategic Sealift Capability of six ro-ro vessels
- The Royal Navy's two hydrographic and oceanographic survey vessels.

In the UK example, many implementations of the SR concept filled personnel gaps for either new capabilities requiring expertise not resident in the UK's armed forces or to add deployment capability to services traditionally provided by civilians in their military.

The SR concept may be useful to the Air Force for some missions. First, the SR concept could ensure unity of command for contractors who deploy in support critical of Air Force operations:

> Under the sponsored reserve concept, contractors employed in the private sector to provide support services for the U.S. military would also be members of a reserve component and would be activated as reservists if and when they were deployed overseas. As activated reservists, these individuals would be subject to the UCMJ, which would resolve many of the legal and operational challenges that traditional contractors present for the Department of Defense. Wormuth et al., 2006

In this vein, Guidry and Wills (2004) recommended its use as a way of providing the workforce for the then-anticipated expansion of Reserve Personnel Appropriation requirements.

The SR concept may also prove useful in the cyberspace mission. In certain areas, this mission area relies on obtaining personnel with unique expertise, experience, and skill. These same personnel command a substantial salary in the civilian world, often far exceeding what they could make in the military or within the General Schedule pay scheme. A contractor is not limited to these pay caps and could offer the financial benefits required to entice these personnel from the civilian sector. When required, these SR personnel could execute military missions within the cyberspace defense or cyberspace force application mission areas. As then–Chief of Staff of the Air Force Gen Norton Schwartz recently noted, as a SR, these personnel "are employees of the company and who can flip from their civilian certification to military credentials . . . simply by appropriate authorities executing the right orders" (Tirpak, 2012).

Another area where the SR concept could be considered is for AFSCs that rarely deploy. Substituting sponsored reservists for these AC personnel may provide monetary benefits to the Total Force. If a need arose for these personnel to deploy, they could be activated to ensure deployed unity of command. Further study is required in this area to flush out the many personnel issues regarding force structure for this proposal.

Cost Considerations

In arranging a mix of AC and RC forces in a mission, we would expect some cost differences that would provide a rational basis for choosing a specific combination of organizational constructs. Cost per owned aircraft would generally be lower in equipped RC units than in equipped AC units, primarily due to RC units flying fewer hours per aircraft per time period. RC crews, on average, require fewer training hours than AC crews. In some cases, RC units are able to generate flying hours at lower cost than AC units.

Classic associate and equipped RC units are two alternative ways of providing a strategic reserve capacity using less-costly RC force structure. Between the two, we would expect the classic associate construct to be slightly less costly. While crew ratios for classic associate and equipped RC units appear to be different, they are actually comparable in most missions.[27] Aircrews in associate and equipped RC units would expect to have comparable proficiency flying requirements and would make comparable contributions to meeting operational demands, so flying hours per RC aircrew would be expected to be about the same in classic associate and equipped RC units. However, because host and associate units generally operate at a more efficient scale than equipped RC units, the classic associate unit's cost per flying hour would be expected to be less than the equipped RC unit's cost per flying hour.

In practice, we have observed some but not all of these expected cost savings. Comparing equipped AC and RC units, Robbert (2012) generally found fewer annual flying hours per owned aircraft in the RC, and hence lower aircraft ownership cost. However, that study found mixed results with respect to costs per flying hour. While some RC units were able to generate flying hours at lower cost than AC units, other equipped RC units had relatively high costs per flying hour due to their inefficiently small scales of operation. Similarly, associate units did not always exhibit the expected lower cost per flying hour. Compared with equipped AC and RC units, the F-16 associate unit at Hill AFB had a lower cost per flying hour, but among three associate KC-135 units, one (at McConnell AFB) had comparable costs per flying hour and two (at Fairchild AFB and MacDill AFB) had higher costs per flying hour.

The C-17 mission has a more extensive associate unit component than any of the three missions (F-16, C-130, and KC-135) examined in Robbert (2012). Using a cost analysis approach similar to that in Robbert (2012), we examined the costs in C-17 units from 2006 to 2010. Unlike Robbert (2012), however, we treated the associate units as though they owned a share of their hosts' aircraft that is proportional to their share of the combined host/associate units' total aircrews. The results are in Appendix C. They show that two of the five C-17 associate units (at Dover AFB and McGuire AFB) had much higher costs per flying hour than other associate units and the equipped AC and RC units. Also, unlike the other missions examined in Robbert (2012), we found that both equipped and associate RC units tended to come

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[27] Consider, for example, a host/classic associate C-17 base with 42 aircraft. C-17 crew ratios are 4.5 for equipped units without an associate, 3.0 for host units, and 1.5 for associate units. In this example, host/associate units would have a total of 189 crews—126 AC and 63 RC. The associate unit provides one-third of the combined units' crews. If it were reconfigured as an equipped RC unit, it would take one-third of the host unit's aircraft with it. The host would be left with 28 aircraft, would still have 126 crews, and a crew ratio of 4.5. The equipped RC unit would have 14 aircraft, its original 63 crews, and a crew ratio of 4.5.

closer to the annual flying hours per aircraft found in AC units and to fly a comparable proportion of their hours as operational. As a result, in spite of their more limited scales of operations, the two equipped RC units had very favorable costs per flying hour and per operational flying hour.

3. Analysis of Missions

The considerations in the previous chapter provide a basis for evaluating which organizational constructs are suitable for various missions. Representative missions evaluated here include four flying missions (F-16, C-130, KC-135, and C-17), three non-flying missions (RED HORSE civil engineering units, space, cyber), and the remotely piloted aircraft (RPA) mission, which has both flying and non-flying mission characteristics. We chose these missions because they are broadly representative of the kind of direct (as opposed to garrison support) missions around which RC wings are generally organized.

A summary of our observations is contained in Table 3.1 (for representative non-space missions) and Table 3.2 (for various space missions). Green stoplights indicate that a criterion favors assignment of the indicated mission to the RC. Yellow and red stoplights indicate increasingly serious concerns with placement of the mission in the RC. We discuss below how we arrived at these observations for each mission. We note also that our assessments are heavily influenced by the demands placed on the Air Force in the past decade. Those who believe similar demands will not likely be faced in the future might make some assessments differently.

Table 3.1. Suitability of Representative Non-Space Missions for Assignment to the RC

	F-16	C-130	KC-135	C-17	RED HORSE	Cyber	RPA (RSO)	RPA (LRE)
Surge demand	Green	Green	Green	Green	Green	Red	Green	Green
Duration of activations	Green	Green	Green	Green	Red	White	Green	Red
Continuation training requirements	Green	Green	Green	Green	Red	Red	Yellow	Yellow
Steady-state deployment demand	Green	Yellow	Yellow	Red	Yellow	Green	Green	Red
Steady-state home-station optempo	Green	Yellow	Yellow	Red	Green	Green	Yellow	Yellow
Readiness	Green	Green	Green	Green	Green	Green	Green	Green
Absorption and sustainment	Yellow	Green	Green	Green	White	White	Green	Green
Overseas basing	Yellow	Green	Green	Green	Green	Green	Green	Yellow
Civilian competencies	Green	Green	Green	Green	Green	Green	White	White
State missions (applies to ANG only)	Red	Green	Yellow	Yellow	Red	Green	Green	Green

NOTE: Colors indicate how a criterion affects suitability of a mission for assignment to the RC: green = suitable, yellow = marginally unsuitable, red = very unsuitable, white = not applicable.

Table 3.2. Suitability of Space Missions for Assignment to the RC

	Launch	Range	Test	Satellite Ops	Warning	Depl Control	In-place Control	Educ/ Tng	Overall
Surge demand	yellow	green	green	yellow	red	green	yellow	white	yellow
Duration of activations	green	green	green	green	green	green	green	white	green
Continuation training requirements	green	green	green	green	green	green	green	green	green
Steady-state deployment demand	green	green	green	green	green	yellow	green	green	green
Steady-state home-station optempo	yellow	green	green	yellow	yellow	yellow	yellow	white	yellow
Readiness	green	green	green	green	green	green	green	green	green
Absorption and sustainment	green	green	green	green	green	green	green	green	green
Overseas basing	green	green	green	green	yellow	green	green	green	green
Civilian competencies	green	white	green	green	red	red	green	green	yellow
State missions (applies to ANG only)	red	red	red	red	red	red	red	red	red

NOTES: Colors indicate how a criterion affects suitability of a mission for assignment to the RC: green = suitable, yellow = marginally unsuitable, red = very unsuitable, white = not applicable. RSO = remote split operations; LRE = launch and recovery element.

For each mission, we found that some organizational constructs are better, from a cost or effectiveness perspective, than others. Table 3.3 contains a summary of these observations. Discussions of each mission, below, expand on how we arrived at these recommendations.

Table 3.3. Preferred Organizational Constructs

	F-16	C-130	KC-135	C-17	RED HORSE	Cyber	RPA (RSO)	RPA (LRE)	Space
AC equipped	✓	✓	✓	✓	✓	✓	✓	✓	✓
RC equipped	✓	✓	✓	✓	✓		✓	✓	
Classic associate		✓	✓	✓	✓	✓	✓	✓	✓
Active associate	✓								
Reserve associate									
IMA	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTE: Checkmarks indicate that an indicated organizational construct is recommended for an indicated mission.

Flying Missions

Suitability Criteria

Each of the four flying missions evaluated here has surge and post-surge requirements under various scenarios. They all have continuation training requirements, represented by the RAP in the case of the F-16 and comparable currency and proficiency requirements for mobility units. Deployment demand and home-station optempo were heaviest in the mobility missions. As indicated in Table 2.8, the C-17 mission was relatively high on this measure. While mobility missions are suitable in most respects for assignment to the RC, deployment demands argue for caution. As indicated in Tables 2.3 through 2.6, mobility pilots, fighter pilots, enlisted aircrew operations, and aircraft maintenance career fields have all experienced a high number of short-duration activations, indicating that RC units with these flying missions are readily able to make contributions to supporting ongoing operational requirements. As discussed above, readiness of RC units is not an issue. The relationship of absorption capacity to sustainment is not an issue for mobility missions but is a major (but addressable) concern for the F-16 and other fighter missions. Overseas basing is an issue for the F-16 because, as indicated in Table 2.13, 23 percent of the total fleet and 42 percent of the active fleet are overseas.[28] The civilian competencies criterion is favorable to the flying missions, because the human capital required for these missions is often reinforced through aviation-related civilian occupations.

Organizational Constructs

All aircraft missions we examined have fleet sizes, presumably predicated on surge requirements, that would provide more than enough steady-state operational capacity if equipped AC units were the only organizational construct employed. With expected costs taken into consideration, this presents the opportunity in mobility units to lower costs through use of equipped RC or classic associate units. However, to fully realize that potential, more flexibility is needed to legitimize use of Reserve Personnel Appropriation funding for operational missions. Classic associations would be slightly favored over equipped RC units because they allow for greater economies of scale within operating units and hence lower costs.

With respect to the KC-135 mission, we make this recommendation guardedly because, in the recent period examined in Robbert (2012), equipped RC tanker units were unable, on average, to produce flying hours at a cost that compared favorably with active units. In that mission, costs would have been lowered substantially by placing the entire fleet in the AC. Further examination is needed to determine whether equipped RC tanker units can be made more efficient (by, for example, merging existing units to achieve greater economies of scale) or whether shifting from equipped RC units to classic associations would provide a cost-saving alternative.

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[28] We evaluated the F-16 mission as marginally unsuitable on this measure. If force structure changes were to make the F-16 look more like the F-15 E (32 percent of total fleet and 69 percent of active fleet overseas), we would evaluate it as very unsuitable.

In mobility missions, we see no demonstrated advantage in establishing active associations. There are too few of them to provide a reliable basis for historic cost comparisons. As a resource to meet operational demands, they present relatively complex mission scheduling, tasking, and equipment deployment issues. If there were some reason to increase the number of AC aircrews, it would seem operationally more straightforward and no more costly to transfer from the RC to the AC the amount of equipment that would be supported by the crew ratio of an active associate unit.

In the case of fighters, where absorption of inexperienced fighter pilots is insufficient to meet total Air Force needs, active associate units are very beneficial. Plans are underway to place detachments of nine AC pilots—two experienced and seven inexperienced—in each RC unit. Plans call for these detachments to be 78 percent inexperienced, compared with equipped AC units that, for efficiency in absorption dynamics, must be limited to 45 percent inexperienced. The higher inexperienced rate in the AC associate units is made possible by the highly experienced RC crew force in the host units. This allows the AC associate units to absorb more per airframe in their constructive share of the force structure than would be possible if their constructive share of the force structure were in equipped AC units. See a further discussion of these dynamics in Appendix D.

Conventional classic associations are not useful in any fighter mission because they would reduce already-limited opportunities for AC aircrews to gain second cockpit tours. However, small cells of reservists or guardsmen in active squadrons, as part of the larger absorption management strategy outlined in Appendix D, would be useful. These cells would be composed of IMAs or some new construct that is essentially similar.

Conclusions

The four flying missions we examined are all generally suitable for assignment to the RC, although there are issues—absorption and overseas basing issues with regard to fighters and deployment/optempo concerns with regard to mobility systems—that call for careful consideration.

RED HORSE

Rapid Engineer Deployable Heavy Operational Repair Squadron Engineers (RED HORSE) units are mobile heavy construction squadrons capable of rapid response and independent operations in remote, high-threat environments. They provide heavy repair and construction capability when requirements exceed normal civil engineer unit capabilities. RED HORSE units specialize in rapid damage assessment, damage repair, bare-base development, and heavy construction operations, such as aircraft parking ramps, munitions pads, and facility repair. These units have special capabilities, such as water-well drilling, explosive demolition, quarry operations, directional drilling, material testing, expedient facility erection, concrete and asphalt paving, and limited mine clearing. To support the "open the airbase" mission, RED HORSE added an airborne capability in 2005 to rapidly deliver small, specialized teams and equipment packages by airdrop or air insertion to conduct expedient airfield repairs. Squadrons can be deployed as a whole or in smaller packages to support specific operational needs.

As indicated in Table 3.4, there are currently four active duty, five AFRC, and five ANG RED HORSE squadrons. The Air Force has also announced the addition of an active RED HORSE squadron at Beale AFB, California, in FY2013.

Table 3.4. RED HORSE Squadron Locations and Associations

Unit	Location	Organizational Construct
Active		
554th RED HORSE Sq	Andersen AB, Guam	Equipped
819th RED HORSE Sq	Malmstrom AFB, MT	Equipped
820th RED HORSE Sq	Nellis AFB, NV	Equipped
823rd RED HORSE Sq	Hurlburt Field, FL	Equipped
ANG		
200th RED HORSE Sq	Port Clinton, OH	Equipped
200th RED HORSE Sq (det)	Mansfield, OH	Equipped
201st RED HORSE	Fort Indiantown Gap, PA	Equipped
201st RED HORSE (det)	Willow Grove, PA	Equipped
202nd RED HORSE Sq	Camp Blanding, FL	Equipped (202nd and 203rd combine to form a full squadron)
203rd RED HORSE Sq	Camp Pendleton, VA	
219th RED HORSE Sq	Malmstrom AFB, MT	Classic associate
254th RED HORSE Sq	Andersen AB, Guam	Classic associate
AFRC		
556th RED HORSE Sq	Hurlburt Field, FL	Classic associate
555th RED HORSE Sq	Nellis AFB, NV	Classic associate
307th RED HORSE Sq	Barksdale AFB, LA	Equipped; subordinate unit in a classic associate bomb wing
560th RED HORSE Sq	Charleston AFB, SC	Equipped
567th RED HORSE Sq	Seymour-Johnson AFB, NC	Equipped

RED HORSE units are made up not only of civil engineering personnel but also support personnel, such as vehicle maintenance, supply, emergency management, service, independent duty medical technician, security forces, and contracting and finance.

The primary RED HORSE activity in garrison is training for contingency and wartime operations. They participate regularly in Joint Chiefs of Staff and MAJCOM exercises, military operations other than war, and humanitarian civic action programs. They perform training projects that assist base construction efforts while at the same time honing wartime skills.

When in garrison, AC and AFRC RED HORSE squadrons are under the administrative control of their respective numbered air force and the operational control of their gaining MAJCOM—except for Pacific Air Forces RED HORSE squadrons, which are under the administrative control of their respective contingency response wing. When in garrison, ANG RED HORSE units are under the administrative and operational control of their respective state adjutant general. During deployments in support of contingency operations, the assigned theater commander of air force forces normally has operational control of deployed RED HORSE squadrons acting under the unified combatant commander.

Suitability Criteria

Surge Demand

RED HORSE was formed specifically to meet wartime needs. Its composition is based on wartime requirements; it is not assigned to an air base to perform peacetime operations and maintenance taskings. Its primary mission in garrison is to train for deployment. The RED HORSE mission by design, whether AC or RC, consists exclusively of surge demand.

Steady-State Deployment Demand

When employed, RED HORSE operations take place in a deployed environment. Training and exercises may drive additional temporary duty requirements. Approximately 30 days of spin-up training is typically required before deployment, especially in cases where joint operations are planned. ACC is the lead for scheduling RED HORSE deployment rotations, and ACC bases the rotation schedule on a 1:2 dwell time for AC units and a 1:5 dwell time for RC units.[29]

Funding for RC RED HORSE deployments is dependent on OCO man-days or mobilization. In this case, man-days are being used as the program intends—times when the AC's capability is not sufficient.

From a career-long perspective, some of the occupations used in RED HORSE units are high on the list of career fields that have experienced above-average deployment demands (see Tables 2.6 and 2.7). This raises a concern with regard to assigning the mission to the RC.

Steady-State Home-Station Operational Tempo

Steady-state operations for RED HORSE consist of training at home station. RC units can schedule this training to fit into traditional reservists' or guardsmen's 39 days per year of duty.

Continuation Training Requirements

RED HORSE members receive mandatory training in airbase defense, convoy operations, weapons proficiency, team and individual combat movement techniques, and specialty-specific training, such as expedient airfield repair, installation and repair of utility systems, well-drilling, paving, and vehicle operation. Training frequency for these skills varies, but in general, requirements for AC members are every 15 month and every 30 months for RC members. Field training is also required every 18 months for the AC and 36 months for the RC in a bare base environment, for a minimum of 48 continuous hours for the AC and 36 continuous hours for the RC. These training timelines have been established to support a 1:2 dwell time for the AC and a 1:5 dwell time for the RC.[30] Additionally training is coordinated and scheduled with the host base to ensure that all support AFSCs receive adequate career progression training and remain familiar with their primary AFSC skills. CONUS-based AC RED HORSE units are assigned as

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[29] AFI 10-209, *RED HORSE Program*, May 8, 2012.
[30] AFI 10-209, *RED HORSE Program,* May 8, 2012.

the lead for training in a particular area and develop special capability training programs, lesson plans, and schedules to support all RED HORSE units.

These training requirements can be accomplished in much less than the 39 days per year provided to RC personnel through drill and annual active duty for training periods. As discussed elsewhere, the cost of the RED HORSE mission could be reduced if drill and active duty periods not needed for training could be applied to active deployments. Legislative relief is required to provide that flexibility.

Short-Duration Activations

RED HORSE squadrons operate as a unit in a deployed environment; therefore, short-duration activations are impractical.

Readiness

RC RED HORSE squadrons undergo the same operational readiness inspections as AC squadrons and are required to complete the same spin-up training. We found no evidence of RC units being any less mission-ready than their AC counterparts. There is recognition, though, of the reservist's part-time status in required response times. Deployment response times for AC RED HORSE personnel and equipment deployment packages vary from 12 to 96 hours. For RC deployment packages, 24 to 48 hours are added.

Sustainability

RC RED HORSE units obtain experienced individuals from those with prior active service as well as recruiting and training those with no prior service. Some units have two operating locations in peacetime to geographically enlarge the potential recruiting area. The two locations divide unit manpower to balance the grade and skill structure at each site.

At any RED HORSE location, AC and RC units draw from the larger civil engineering population at a base. Table 3.5 shows the percentage of the enlisted civil engineers in the ANG and AFRC who had prior active service. These percentages show an adequate base from which to find individuals experienced in civil engineering operations.

Table 3.5. Percentages of RC with Prior AD Experience, 4QFY2011

DAFSC	ANG total	ANG prior svc	% ANG prior svc	AFRC total	AFRC prior svc	% AFRC prior svc
3EXXX	8,132	2,928	36.0	4,888	2,512	51.4

Overseas Basing

One of the four AC RED HORSE squadrons is located overseas—the 554th RHS (AC) at Andersen AB, Guam. The other three RED HORSE squadrons plus all other CONUS civil engineering squadrons provide a sufficient rotation base.

Civilian Competencies

In the civil sector, construction, paving, and heavy equipment operation is largely seasonal work, or is contract work with specific start and completion times. This benefits RC civil engineer units broadly and RED HORSE units specifically, since RC members are able to deploy without adversely impacting their civilian employment. In addition, the skills required for those serving in RED HORSE units are not outmoded quickly by new techniques and equipment, and do not atrophy significantly from misuse (as compared with the skills required for cyberspace individuals, for example). We found repeated examples of individuals with civilian jobs in the Department of Transportation, large construction firms, independent heavy equipment operators, etc. Individuals with these skills are prevalent in the civil sector, and military pay is comparable to civilian salaries. U.S. unemployment in the construction sector was 11.3 percent in August 2012 (as compared with 8 percent in all sectors), resulting in reservists and guardsmen ready to volunteer for MPA man-days and deployments.

Organizational Constructs

We found no reason to disfavor either equipped or classically associated RC units, but see no compelling reason to incur the complexities of active or reserve associations.

Conclusion

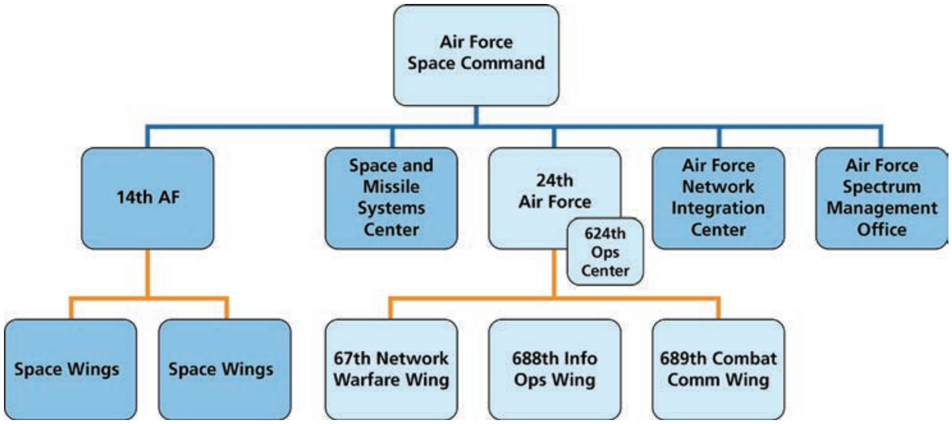
RED HORSE is an exceptionally well suited mission for the RC and also well suited for classic associations. In particular,

- RED HORSE units' entire mission is surge.
- With current associations, the RC can augment the AC with volunteers ready to deploy.

Cyber

Cyber, as a distinct mission, is relatively new to the Air Force. Although the Air Force has executed elements of this mission for decades, the designation of a numbered Air Force for the mission did not occur until 2009. The 24th Air Force, responsible for certain cyber missions in the Air Force, was created on August 18, 2009, and reached full operational capability on October 1, 2010. It is a component of the Air Force Space Command (AFSPC) (see Figure 3.1).

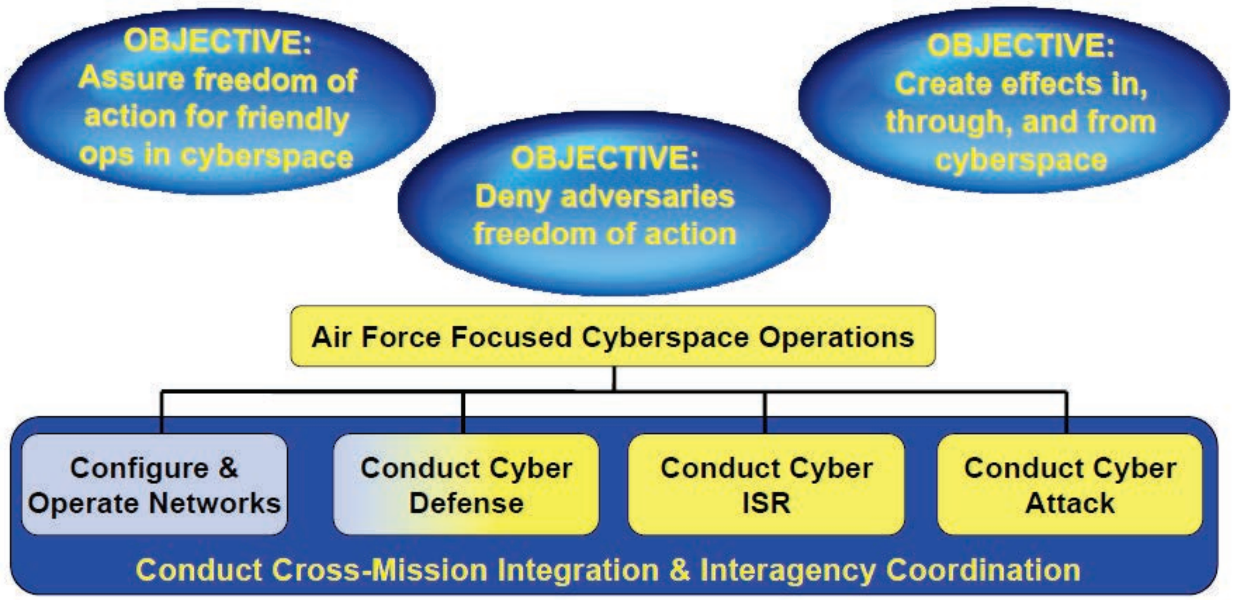
Figure 3.1. 24th Air Force Command Structure



Three major units are headquartered at Lackland AFB, Texas. The Cyber Operations Center has a mission "to establish, plan, direct, coordinate, assess, command and control full spectrum cyber operations and capabilities in support of Air Force and Joint requirements" (24th Air Force, 2012). This unit consists of approximately 200 military and civilian personnel. The 67th Network Warfare Wing is "the Air Force execution element for Air Force network operations and providing network warfare capabilities to Air Force, joint task force and combatant commanders that operate, manage and defend global Air Force networks" (24th Air Force, 2012). This unit consists of approximately 2,000 military and civilian personnel. The 688th Information Operations Wing creates "the information operations advantage for combatant forces through exploring, developing, applying and transitioning counter information technology, strategy, tactics and data to control the information battlespace" (24th Air Force, 2012). This unit consists of approximately 1,000 military and civilian personnel. Additionally, the 689th Combat Communications Wing, headquartered at Robins AFB, Georgia, trains and deploys expeditionary communications, information systems, engineering and installation, air traffic control and weather services (24th Air Force, 2012). This unit consists of approximately 1,000 military and civilian personnel. In addition to 24th Air Force units, all distributed communications capabilities throughout the Air Force are in some sense part of the larger Air Force cyber community—an inference from the recent redesignation of former communications career fields as *cyber operations* (officer) and *cyberspace support* (enlisted).

The emerging cyber mission (excluding conventional communications functions) includes three distinctive areas: *cyberspace support*, *cyberspace defense*, and *cyberspace force application* (also thought of as *offensive cyberspace*) (see Figure 3.2). Cyberspace support focuses on configuring and operating networks and other cyber-related elements. Cyberspace defense focuses on protecting and actively defending networks and other cyber-related elements from adversary or criminal attacks. Cyberspace force application focuses on attacking adversary networks and other cyber-related elements. Cyberspace intelligence, surveillance, and reconnaissance (ISR) is required to support cyberspace defense and cyberspace force application. Cyberspace support and cyberspace defense in the Air Force hold some similarities to cyber operations in the civilian world, with the exception that defensive cyber in the military must also protect classified networks. Defensive cyber techniques are often similar to what is done to defend Fortune 500 companies or other government agencies. Cyberspace force application is unique, is illegal outside of approved government operations, and requires forces operating under Title 10.

Figure 3.2. Air Force Cyberspace Mission Elements



SOURCE: Mandico, 2010.

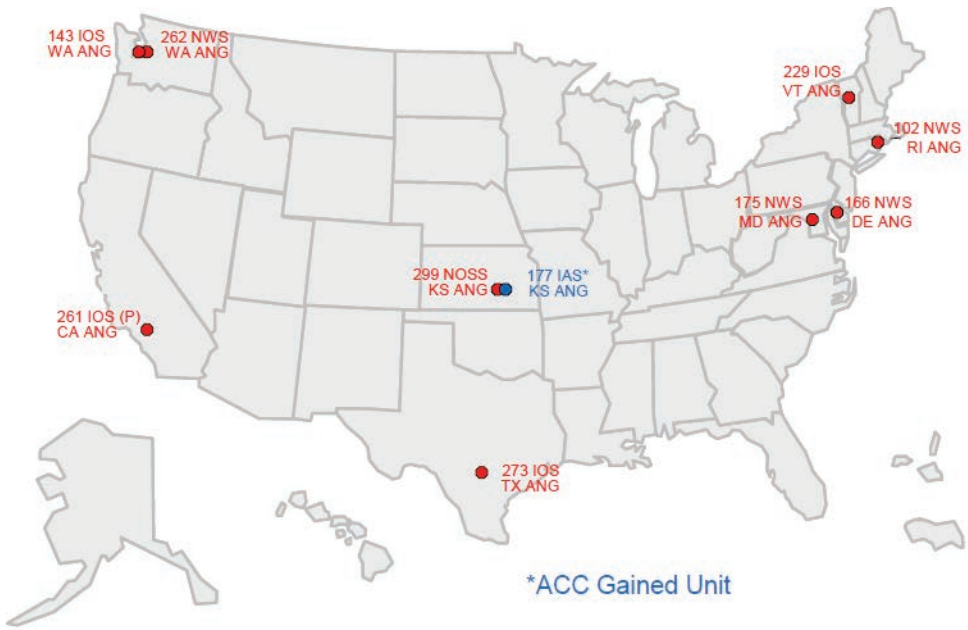
The cyberspace mission is unique in that, while other mission areas in the Air Force are constant or decreasing in size and scope, it is growing rapidly, similar to the rapid growth seen in the RPA mission.

Building on the work done by Scott et al. (2010), this analysis will focus on the three cyberspace mission areas discussed above. Elements of conventional communications functions, such as air traffic control, weather services, and local base communications services, will not be addressed in this analysis.

The RC is a key piece of the cyberspace mission, with multiple established locations and more announced or planned.[31] Figure 3.3 shows the bed-down of ANG Cyberspace units. RC IMAs also supplement almost every cyberspace unit in the AC.

[31] In March 2012, the Air Force announced the establishment of three new total force cyber units, consisting of two ANG information operations squadrons to be located in Washington state and California, and one AFRC association with the 33rd Network Warfare Squadron at Lackland AFB, Texas.

Figure 3.3. Air National Guard Cyberspace Units



SOURCE: Zissimos, 2012.

Suitability Criteria

Surge Demand

Overall, the cyber mission has both a steady-state and a potential surge demand. Heretofore, the mission has experienced a build-up of steady state requirements. Presumably, at some point, the steady-state demand will stabilize, and surge requirements will be defined. Cyberspace support as a specific mission area does experience a surge demand during significant combat operations. Cyberspace defense does not experience a significant surge demand, though its optempo is high during steady-state operations. Cyberspace force application does experience a surge demand during significant combat operations.

Steady-State Deployment Demand

None of the three mission areas require any significant steady-state deployments. Most missions can be accomplished from any location in the United States as long as the appropriate support equipment, facilities, and connections are present. In this respect, the cyber missions are similar to the RPA RSO mission.

Steady-State Home-Station Operational Tempo

Over the past several years, operational demands in the cyberspace mission have exceeded capacity, driving a high optempo for cyberspace units. Ordinarily, this would make the cyberspace mission unsuitable for the RC. However, additional factors need to be considered. A primary reason that optempos are high is that the recruitment for highly qualified operators in the cyberspace defense and cyberspace force application areas is difficult, and the requirement for this expertise exceeds the current recruiting supply.

One fix is to recruit qualified personnel from the civilian cyberspace sector. Many of these personnel may not be interested in joining the AC, but may be willing to serve their country in a part-time capacity while still maintaining their high-paying civilian jobs. This is one possible application for the sponsored reserve concept discussed in this report. As contracted personnel, these positions would not be limited to General Schedule pay table limitations, and could be activated if required for missions which require military personnel. Another option is to increase the percentage of full-time personnel and the numbers of technicians and AGRs in RC cyberspace units.

Continuation Training Requirements

While cyberspace weapon systems have no continuation training equivalent to that for aircrews, there are continuation training-like requirements for certain mission areas, such as certification requirements within cyberspace support. Most of the activities in the cyberspace defense and cyberspace force application mission areas are operational rather than training in nature.

Short-Duration Activations

Personnel in the cyberspace support mission area rarely require activations. Personnel in the cyberspace defense mission area may require authorization under Title 50, U.S. Code, for certain ISR activities. Personnel in the cyberspace force application mission area do require activation, per Title 10, U.S. Code, for certain activities, such as those involved in any part of a cyber "kill chain." These members of an RC unit may be on non-federal (Title 32) status when not involved with an operational mission or activity, but they must transition to Title 10 status when they participate with an operational mission or activity. Until this transitional status and associated MPA funding issues are seamless, this criterion highlights a consideration within the cyberspace enterprise.

Readiness

We found no evidence of RC units in any mission being less ready than their AC counterparts. In fact, RC members who are employed by companies such as Google, Yahoo, Microsoft, and Cisco may bring the most unique and current expertise.

Absorption and Sustainability

Absorption is generally not an issue in non-flying missions. Table 3.6 indicates that, as of the end of FY2011, a significant portion of RC personnel in critical cyberspace positions had prior active duty experience. As the cyberspace mission continues to mature, it is expected a similar transfer of experienced cyberspace personnel will join the RC after leaving the AC, as has historically happened in the fighter community. As discussed elsewhere in this document, as long as the AC/RC force mix option eventually chosen by the Air Force is no greater than approximately 50 percent RC, sustainability will not be a limitation for this mission in the RC.

Table 3.6. Percentages of Reserve Component Personnel with Prior Active Duty Experience, 4QFY2011

DAFSC		ANG total	ANG prior svc	% ANG prior svc	AFR total	AFR prior svc	% AFR prior svc
17D - Cyberspace Operations	Officer	776	421	54.3	447	410	91.7
1B4 - Cyberspace Defense	Enlisted	50	31	62.0			
3D0 - Cyberspace Operations	Enlisted	4,634	1,844	39.8	2,531	1,367	54.0
3D1 - Cyberspace Systems	Enlisted	6,602	2,758	41.8	1,328	820	61.7

SOURCE: RAND database archive from Air Force Personnel Center.

Availability

Traditional reservists and guardsmen serving 39 days per year are not a cost-effective method for providing steady-state cyber services. If guidelines for training are adhered to, the majority of this time must be dedicated to training (perhaps not related specifically to their cyber duties), and any operational duties they perform must be incidental to their training.

Table 3.7 shows the man-days served by AFRC and ANG cyber personnel in FY2011. Cyber officers serve in Cyberspace Operations (AFSC 17C/D), and enlisted cyber personnel serve in Cyberspace Operations (AFSC 3D0XX) or Cyberspace Systems (AFSC 3D1XX). ACC was the biggest user of man-days for cyber RC personnel, at 33 percent—followed by AMC, at 18 percent; Air Force Intelligence, Surveillance and Reconnaissance Agency (AFISR), at 11 percent; and AFSPC using only 8 percent of the cyber man-days in FY2011, despite its significant cyber mission. In our data set for FY2011, only 663 man-days were used by officers and enlisted in cyber AFSCs at U.S. Cyber Command. The location for 34 percent of the man-days served by the RC in FY2011 was in the U.S. Central Command area of responsibility. This leads us to believe that man-days for cyber personnel are used primarily to meet conventional communications requirements rather than the three emerging mission areas we focused on in this analysis.

Table 3.7. FY2011 Man-Days Served by Reserve Component Cyber Personnel

	AFRC			ANG		
	Total Man-Days	Avg Tour Length	Number of Tours	Total Man-Days	Avg Tour Length	Number of Tours
Officers - 17C/D/X	17,871	67	275	18,189	71	255
Enlisted - 3D0/1/X	87,436	134	653	256,623	113	2,276

Overseas Basing

While cyberspace personnel in conventional communications roles are stationed outside CONUS, we found no evidence of plans for locating emerging mission area units overseas.

Civilian Competencies

RC members who are employed in industries related to cyber operations can be tapped to provide current knowledge, tools, and techniques for network warfare operations. "Many RC service members hold civilian jobs in advanced technology fields or in providing education or training for such technologies. As a result, the RC provides both a logical and cost-effective source for individuals with relevant advanced technology skills" (Office of the Vice Chairman of the Joint Chiefs of Staff and Office of the Assistant Secretary of Defense for Reserve Affairs, 2011). There is arguably no mission area in the Air Force that can benefit more from civilian competencies than the cyberspace mission. The civil sector can often offer increased compensation to attract the best and the brightest for cyber positions. It is difficult for the military to attract many of these same personnel because of the relatively low compensation. The RC may be the only avenue available to attract this talent, allowing individuals to maintain their high-paying jobs in the civilian sector while serving their country in the RC. Maj Gen William T. Lord, as Chief of the Air Force's provisional Cyber Command, has stated "[We] want to harness the brain power of the type of employees that Google, Yahoo and Microsoft and other companies have" (Matthews, 2008).

Proactive, personalized management of these members must be used to take advantage of special civilian skills and experience. This can best be accomplished by employing them as IMAs so that they can fall in on an existing structure and immediately put their skills to use.

Relevance to State Missions

Cyberspace support and cyberspace defense mission areas have applicability to state missions. Col Tom Thomas, former commander of Delaware Air National Guard's 166th Network Warfare Squadron, noted,

> Protecting the networks and computer systems that are vital to a state's commerce and public safety is likely to become as much a part of the Guard's job as is stacking sand bags to keep floods from factories, hospitals and neighborhoods. The Guard stands ready to assist in deterring and responding to cyber intrusions. (Matthews, 2008, p. 40)

Organizational Constructs

The benefits of proximity to established communications networks would seem to favor organizational constructs that marry RC manpower to AC equipment.

Conclusions

All cyberspace mission areas, especially cyberspace support and cyberspace defense, are suitable for the RC. In fact, elements of the mission are tailor-made for the RC:

- no deployments
- allows the Air Force to benefit from developed civilian expertise
- high readiness in most areas due to civilian similarities
- may be appropriate for implementation of sponsored reserve concept
- beneficial to state mission and operations.

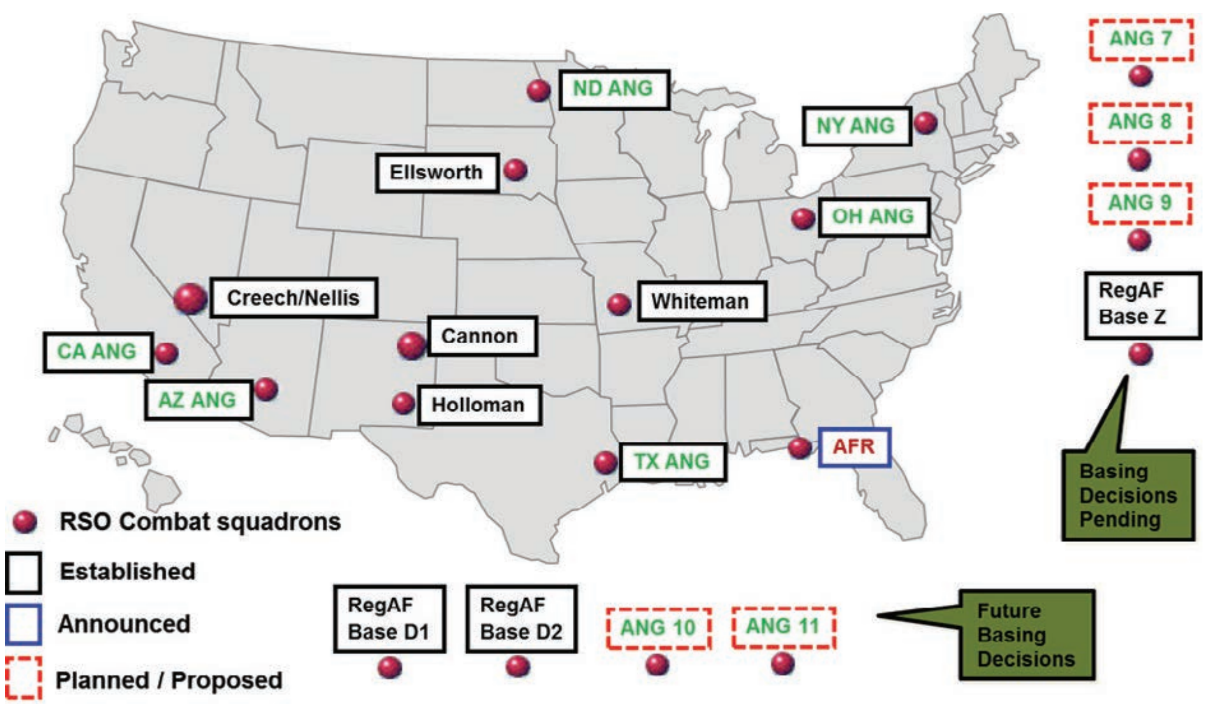
The Remotely Piloted Aircraft Mission

The RPA mission has characteristics of both flying and non-flying missions and is also the fastest-growing mission in the Air Force. "The USAF is already training more UAV pilots than F-16 pilots. Within two to three years, Air Force officials predict, drone pilots will outnumber F-16 pilots, numbering as high as 1,100" (Church, 2011).

This section will build on previous work regarding the RPA mission in the ANG (Lynch, 2007), with updated analysis of current bed-downs and concepts of operations. When that 2007 study was published, there were 18 steady-state MQ-1 Predator and MQ-9 Reaper combat air patrols (CAPs), with a planned growth to 33 by the end of FY2008. As of 2010, the Air Force long term plan was to establish 50 steady-state CAPs, with a capability to surge to 65 CAPs (Deptula, 2010).[32] As of 2012, the planned number of steady-state CAPs by the end of FY13 is 65, with a surge capability to 85 (Department of the Air Force, 2012b). Additional changes in Air Force steady-state and surge capabilities are possible and will be influenced by tension between CAP demand and cost.

The RC provides key pieces of the RPA mission, with six established locations, and another six either already announced or planned (see Figure 3.4).

Figure 3.4. Remote Split Operation Squadrons Established/Announced/Proposed Basing



SOURCE: AF/A8XF Total Force Enterprise RPA System Force Composition Analysis.

[32] A CAP, in this context, is a requirement to have 24-hour RPA coverage of a specific target area.

There are two parts to the RPA mission: a launch and recovery element (LRE) and remote split operations (RSO). The LRE controls the start, taxi, takeoff, and departure of the RPA until approximately 10 nautical miles away from the takeoff airfield, at which point it hands off control to an RSO. On the RPA recovery, the RSO hands control back to the LRE approximately 10 nautical miles out from landing. The LRE mission is performed using line-of-sight communications with the RPA and thus requires that those personnel be forward-deployed to the RPA departure and arrival airfield. This line-of-sight link does not suffer the latency of the satellite links (a little over 1 second), and is required for takeoff and landing operations. The RSO controls the RPA through satellite links, allowing the pilots and sensor operators to be located anywhere in the world. The vast majority of missions flown in combat are flown through an RSO. The typical employment in Afghanistan is a launch by the deployed LRE, handoff to one of the many AC or RC RSO locations, then a hand back to the forward deployed LRE. For the RSO mission, there is no deployment requirement; it is a "fight in place" concept. For the LRE mission, though, there is a deployment requirement.

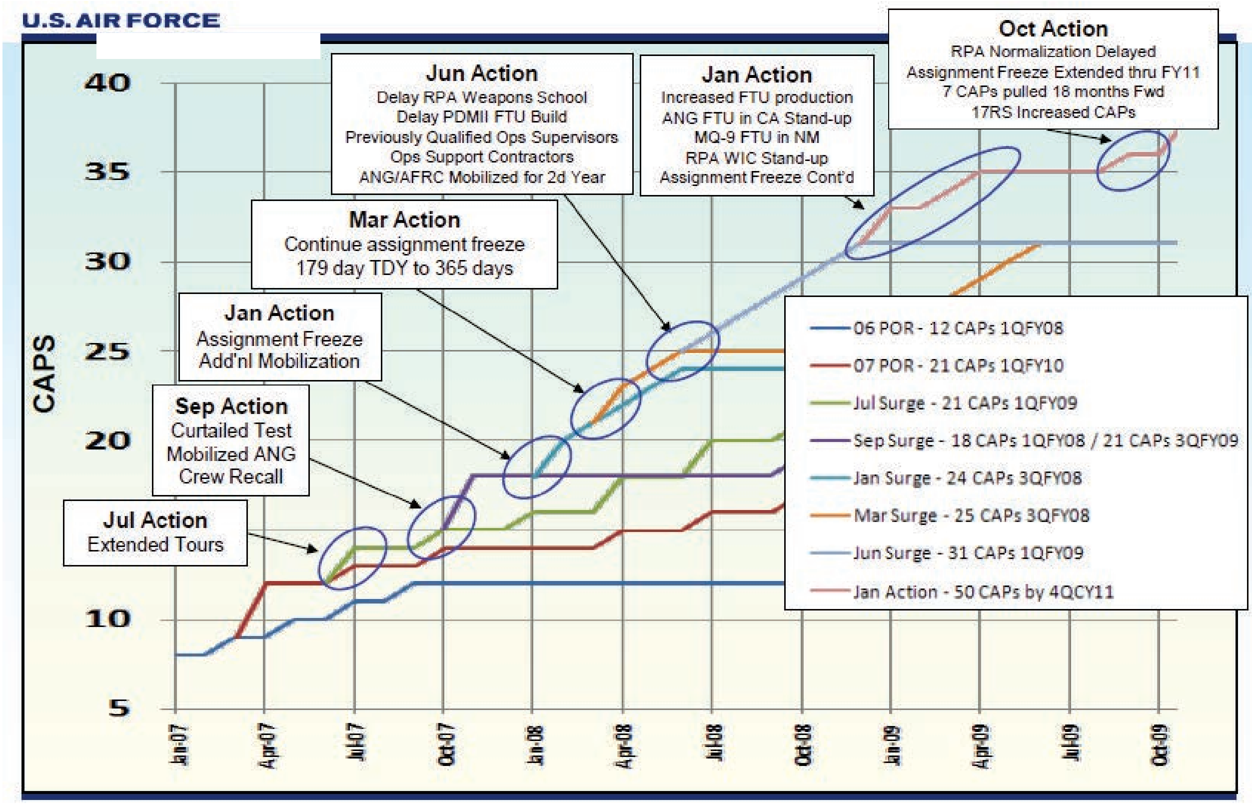
This section has three parts. The first part analyzes the RPA mission, based on the RC suitability criteria listed in this report. The second part will recommend a weight of effort for the RPA mission within the RC, based on this methodology and the Total Force Enterprise RPA System Force Composition Analysis. The final part will address other miscellaneous points relevant to the mission suitability discussion. The following discussion will assume that the current requirement for 65 steady-state and 20 surge/continuation training CAPs is valid, that all units will be fully manned with a 10:1 crew ratio, and that the entire planned RPA fleet will be fielded.

Suitability Criteria

Surge Demand

As indicated above, the RPA mission has both a steady-state and a surge demand. In the past, this surge demand for RPAs was not truly a surge demand, but rather a plus-up of steady-state requirements. Figure 3.5 illustrates this continuous surge demand from 2007 to 2009, demonstrating that the RPA enterprise has been on a growth path for the past ten years. Presumably, at some point, the steady-state demand will become stable, and there will be a surge requirement in addition to it.

Figure 3.5. Air Force MQ-1/9 Remotely Piloted Aircraft Surge



SOURCE: Deptula, 2010.

Steady-State Deployment Demand

The LRE mission entails a significant deployment demand. As such, it is not suitable for assignment to the RC. The RSO mission, on the other hand, has virtually no deployment demand and is therefore well suited to the RC.

Steady-State Home-Station Operational Tempo

Over the past several years, operational demands in the RPA mission have exceeded capacity, driving a very high optempo for RPA units. Ordinarily, this would make the RPA mission unsuitable for the RC. However, two additional factors need to be considered. First, foreseeably, as U.S. forces disengage from hostile engagements in Afghanistan, steady-state demand will likely moderate to the point that it is less than capacity. Second, a primary reason that optempos are high is that the training pipeline for RPA operators could not be expanded rapidly enough to meet growing needs (Hardison, Mattock, and Lytell, 2012). The RC was able to build RPA units relatively rapidly by converting experienced fighter pilots to RPA operators, significantly reducing demands on the training pipeline. This facilitated more rapid growth in the number of CAPs that could be supported. It did, however, require a relatively large proportion of full-time rather than part-time positions in the RC units.

Continuation Training Requirements

Currently, no true continuation training program exists for RPA crews. This is due to the need to man operational CAPs with every available resource. The current plan is to implement a continuation training program by 2013, though this continuation training program will be unique. "Because of the unique nature of this system, the RAP taskings will be fulfilled utilizing simulators (50 percent of requirements), operational missions (25 percent of requirements), and traditional training (25 percent of requirements)" (Department of the Air Force, 2011). By 2017, the current plan is to fully man, equip, and fund the entire RPA enterprise. Once this goal is reached, this continuation training program should be standardized, and should operate along with the RC steady-state CAP requirement, just as the air sovereignty alert steady-state requirement operates alongside the continuation training program within RC F-16 squadrons.[33]

Short-Duration Activations

Missions in which short-duration activations are prevalent are more suitable for assignment to the RC than missions characterized by longer activations or deployments. This criterion is difficult to apply to the RPA mission. Both the MQ-1 and the MQ-9 carry lethal ordnance. By 2009, RPAs had delivered 703 Hellfire missiles and 132 GBU-12 500-pound laser-guided bombs against enemy targets. For an RC unit with a steady-state CAP, each member of the unit who is involved in any part of the "kill chain" must be on an activated federal (Title 10) status for the duration of the mission.

> In November 2007, HQ USAF/JAO [Air Force Operations and International Law Directorate] determined that members of the Air Force Distributed Common Ground System (DCGS), as well as all other functions that perform and contribute to targeting, intelligence gathering and operations of the systems that accomplish such functions should be uniformed military personnel. (Department of the Air Force, 2011)

The pilots, the sensor operators, the mission intelligence coordinators, and the squadron operations center personnel are all included as part of the "kill chain." These members of an ANG RSO unit may be on non-federal (Title 32) status when not involved with an operational CAP, but they must transition onto Title 10 status when they participate with an operational CAP. Until this transitional status and associated MPA funding issues are seamless, this criterion highlights an RC limitation in the RPA enterprise. Still, the RSO mission can be executed with activations that are manageable in the RC, whereas the LRE mission, performed exclusively in forward locations, requires extensive deployment that makes it less suitable for assignment to the RC.

Readiness

We found no evidence of RC units in any mission being less ready than their AC counterparts. Thus, while readiness is an important consideration, we find all missions suitable on this criterion.

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[33] In view of restrictions on Reserve Personnel Appropriation funding of active missions, some air sovereignty alert taskings are designed to revert from training to operational as needed. RPA taskings could be similarly configured.

Absorption

This is not a current limitation for the RPA enterprise in the RC, since most RC unit stand-ups have been accomplished by transitioning experienced RC fighter units to the RPA. Whether or not absorption requirements will be an issue in the future will depend on the growth, as yet unprojected, of RPA positions on staffs, in training units, and other similar requirements outside of operational units.

Sustainability

As Table 3.8 indicates, a significant portion of RC personnel in critical RPA positions are prior active duty. This high percentage is predominantly driven by the fact that the ANG units flying the RPAs were primarily manned with the fighter pilots in the unit when the conversion occurred. As the RPA mission matures, a similar transfer of experienced RPA pilots and sensor operators will join the RC after leaving the AC, as has historically happened in other communities.

Table 3.8. Percentages of Reserve Component with Prior Active Duty Experience, 4QFY2012

	ANG Total	ANG Prior Svc	% ANG Prior Svc	AFRC Total	AFRC Prior Svc	% AFRC Prior Svc
11U - RPA Pilot	215	135	62.8	94	82	87.2
1U0 - RPA SO	255	109	42.7	119	84	70.6

SOURCE: RAND database archive from Air Force Personnel Center.

While all of the RSO force mix options discussed in the next section meet the minimum representation requirement, about half exceed the maximum sustainability requirements. As long as the AC/RC force mix option eventually chosen by the Air Force is no greater than approximately 50 percent RC, sustainability will not be a limitation for this mission in the RC.

Overseas Basing

While there has been discussion of permanently stationing RPA units overseas, there is no currently programmed overseas RPA unit.

Civilian Competencies

Missions with some very specialized human capital demands can benefit from skills developed in civilian occupations by part-time reservists and guardsmen. Missions with this characteristic can benefit from RC participation. Many part-time RC fighter and transport pilots also fly in their civilian jobs, with many flying for the airlines. For example, in the 120th Fighter Squadron at Buckley AFB, Colorado, 62 percent (8 of 13) of the part-time F-16 pilots also fly for the airlines. Many of the skills used when flying in the airlines have transportability to flying in the military. Skills such as instrument flying, navigation, experience with different weather conditions, and overall air sense are similar in both civilian and military flying. While this transportability is greater for transport pilots than it is with fighter pilots, both communities benefit.

Currently, there are few civilian RPA-related jobs, but in time, this lack of civilian opportunities will change. This dearth of civilian RPA jobs is primarily because RPAs cannot currently operate outside of very restricted airspace. Most of those limitations are about to change. The Federal Aviation Administration (FAA) Reauthorization and Reform Act of 2012 states that the "Secretary of Transportation . . . shall develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system" (P.L. 125-95, 2012). This integration calls for the clearance of RPAs under 55 pounds by FY2014 and all RPAs by FY2015. Once the FAA lifts the RPA flight limitations, civilian RPA opportunities will greatly expand. Table 3.9 lists civilian use areas of RPAs determined by Hardison, Mattock, and Lytell (2012). The expansion of this job market will likely adversely affect AC retention, but the RC role in this mission provides an opportunity to retain some of the RPA-related human capital developed in the AC.

Table 3.9. Nonmilitary Remotely Piloted Aircraft Applications

Application	Sector
Agricultural spraying, crop dusting	Civilian/commercial
Cargo transport (e.g., FedEx)	Commercial
Disaster surveillance (e.g., earthquakes)	Civilian
Earth science	Civilian
Climate observation	—
Topographic mapping	—
Weather reconnaissance	—
Film and television (e.g., aerial footage)	Commercial
Homeland security	Civilian
Coastal and border patrols	—
Broad area surveillance (e.g., monitoring drug smuggling)	—
Land management	Civilian
Wildlife population monitoring (e.g., fisheries protection)	—
Wildfire management (e.g., spray fire retardants)	—
Local law enforcement (e.g., surveillance)	Civilian
Transportation	Civilian/commercial
Road infrastructure assessments	—
Road traffic monitoring	—
Utility monitoring/surveillance (e.g., power lines)	Commercial

SOURCE: Hardison, Mattock, and Lytell, 2012.

Relevance to State Missions

Missions that also provide benefit to the state government are favorable for the ANG. RC-flown RPAs can aid RC state-based missions, such as support during natural disasters. Predator aircraft were first used to support rescue efforts during Hurricane Katrina. Since then, many state and national agencies have realized the benefits of integrating RPAs in natural disasters and search and rescue operations. Recently, the 163rd Reconnaissance Wing out of March AFB, California, supported a State of California exercise focused on recovery from a simulated major earthquake in Southern California. The MQ-1s from March were tasked to provide full-motion video to state emergency response organizations to support damage assessment and search and rescue operations.

> The exercise highlighted the Remotely Piloted Aircraft capabilities in a domestic operation setting. These types of (domestic operations) include search and rescue, counter-drug and border operations, disaster response and Department of Homeland Security support. The operation also showcased the benefits of the synergistic relationships between the Army National Guard, the Air National Guard, the State Military Reserve, and civilian agencies. (Covington, 2012)

Figure 3.6 is a picture from a predator drone used to help combat the 2011 Sierra Vista fire in Arizona. Federal and Arizona state agencies requested help from the U.S. Customs and Border Protection. The CBP granted this request and provided full-motion video to the Incident Command Post. The incident commander stated, “This is a huge step forward for the federal firefighting community including the Bureau of Land Management and the Forest Service, I cannot tell you how appreciative and excited we are for your cooperation” (quoted in Department of Homeland Security, 2011).

Figure 3.6. Views of June 5, 2011, Sierra Vista Fire from U.S. Customs and Border Protection Predator Drone

SOURCE: U.S. Customs and Border Protection.

Organizational Constructs

Appendix E contains results of RPA force composition analyses conducted by the Air Force Directorate of Strategic Planning, Total Force Enterprise Management Division (AF/A8XF). For the RSO mission, this analysis found that the least expensive option that meets steady-state and surge demands (Force Mix Option [FMO] 2) consists of AC and RC equipped units and no associate units. For LRE units, the low-cost options that meet operational demands (FMOs 2 and 3) both include equipped AC and RC units and classic associations. However, as noted above, we believe the LRE mission, which entails either overseas basing or extremely high deployment levels, is unsuited to the RC.

Conclusions

The RPA mission is emerging as generally suitable for assignment to the RC, except for the LRE piece of the mission.

Space

The Air Force's space enterprise comprises diverse areas of activity: development and testing of space and missile systems, spacelift/launch, satellite operations, warning (regarding others' missiles, space launches, and nuclear detonations), and space control. We do not address the intercontinental ballistic missile (ICBM) mission here: Air Force Global Strike Command is responsible for ICBM operations and maintenance. The Air Force's 1967 study[34] found the ICBM mission inappropriate for the RC, and Air Force leaders decided recently to separate the missile and space officer career fields that were merged in 1994.

Table 3.10 lists today's relevant space units in the three components. The AC has five space wings: 21st at Peterson AFB, Colorado; 30th at Vandenberg AFB, California; 45th at Patrick AFB, Florida; 50th at Schriever AFB, Colorado; and 460th at Buckley, AFB, Colorado. The Air Force Reserve has one space wing, the 310th headquartered at Schriever AFB. The ANG's space units fall under the Alaska, California, Colorado, Florida, and New York state governments. Table 3.8 lists three non-USAF organizations because they have backup or supporting affiliates in the RC: (1) AFRC's 6th Space Operations Squadron at Schriever AFB backs up the National Oceanic and Atmospheric Administration's (NOAA's) Office of Satellite Operations at Suitland, Maryland, (2) AFRC's 9th Space Operations Squadron and ANG's 216th Operations Support Squadron at Vandenberg AFB are associates to the 614th AOC and support U.S. Strategic Command's Joint Space Operations Center (JSpOC), also at Vandenberg, and (3) the 222nd Command and Control Squadron at Griffis International Airport, Rome, New York, provides augmentees to the National Reconnaissance Office (NRO).

Most space elements do their work in place during peacetime, surge, and wartime. Notable exceptions are three AC space control squadrons with elements that deploy worldwide to support COCOM operations: the 4th Space Control Squadron at Holloman AFB, New Mexico, and the 16th Space Control Squadron and 76th Space Control Squadron at Peterson AFB, Colorado. Among these three, only the 16th has an associate unit, AFRC's 380th Space Control Squadron.

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[34] Air Force Assistant Chief of Staff for Studies and Analysis, *A Study of the Feasibility of Using Reserve Forces in the Strategic Missile Mission*, May 1967. Because the mission requires constant alert status and nearly instantaneous response to warning, it would need full-time military/civilian ARTs predominantly, implying little cost difference from using AC personnel. The study concluded that ARTs could perform the mission as effectively as the AC, the Human Reliability Program could be administered, and the missile mission and the custody of nuclear weapons would be legal for the RC, but that it would take nationwide recruiting to grow and sustain ART strengths in ICBMs' sparsely populated geographical areas. The study judged ICBMs incompatible with the then-current concept of the RC's mission: augmenting, supplementing, or supporting the AC in U.S. national emergencies. "The . . . [proposal] would merely supplant active military personnel with Federal Civil Service personnel."

The 16th and 380th operate the Rapid Attack Identification, Detection, and Reporting System (RAIDRS), deploying transportable antennas worldwide to intercept and geolocate SATCOM jammers, electromagnetic interference, and other signals. The 76th and 4th also have elements that deploy globally, providing combat space superiority, offensive counterspace, and space situational awareness using the Counter Communications System (CCS). Plus Schriever's 4th Space Operations Squadron has three geographically distributed Advanced Ground Mobile vehicles deployable with U.S. Northern Command and U.S. Strategic Command commanders when necessary to provide survivable, enduring, secure communications and constellation command and control during trans- and post-attack phases of nuclear war. In the ANG, the 137th Space Warning Squadron's mobile ground system also is deployable.

Table 3.10. Space Unit/Organization Locations and Associations (as of March 1, 2012)

(Shaded blue if unit/org has a partner/associate unit in another component)

Partner Units in Air Reserve Components

				Type of squadron/unit	Space operations					Space warning				Space control	Ops support	Test	Range ops	Cmd/ cntrl	Educ/ trng	
				Command	AFRC				ANG	AFRC		ANG		AFRC	ANG	AFRC	ANG	ANG	AFRC	ANG
				Wing	310SW					310SW		140 Wg		310SW		310SW				
				Group/State	310OG				CA	310OG		CO	AK	310OG	CA	310OG	FL	NY		CA
		Host or Un-partnered Units		Squadron/org	6th	7th	9th	19th	148th	8th	8th, Det1	137th	213th	380th	216th	14th	114th	222nd	Reserve NSSI	216 OSS
Command	Wing	Group	Squadron/org	Installation	Sch	Sch	Vdb	Sch	Vdb	Bkl	Sch	Grly	Clr	Ptsn	Vdb	Sch	Ptrk, Cp Cnv	Griffiss	CoSp	Vdb
Space launch squadrons																				
AFSPC	30SW	30 Launch Gp	4 Space Launch Sq	Vandenberg AFB, CA																
AFSPC	45SW	45 Launch Gp	5 Space Launch Sq	Cape Canaveral AFS, FL																
AFSPC	45SW	45 Launch Gp	45 Launch Support Sq	Cape Canaveral AFS, FL																
Space operations squadrons																				
AFSPC	50SW	50 Ops Gp	1 Space Ops Sq	Schriever AFB, CO		A														
AFSPC	50SW	50 Ops Gp	2 Space Ops Sq	Schriever AFB, CO				A												
AFSPC	50SW	50 Ops Gp	3 Space Ops Sq	Schriever AFB, CO																
AFSPC	50SW	50 Ops Gp	4 Space Ops Sq	Schriever, Vandenberg					UE											
AFSPC	50SW	50 Network Ops Gp	21 Space Ops Sq	Vandenberg, Keena Pt Msl (HI), Guam, Diego Garcia, Onizuka																
AFSPC	50SW	50 Network Ops Gp	22 Space Ops Sq	Schriever AFB, CO																
AFSPC	50SW	50 Network Ops Gp	23 Space Ops Sq	New Boston AFS, NH; Thule AB, Greenland; Oakhanger, UK																
NOAA	Office of Satellite Operations			Suitland, MD; Wallops, VA; Fairbanks, AK	UE															
Space warning squadrons																				
AFSPC	21SW	21 Ops Gp	6 Space Warning Sq	Cape Cod AFS, MA																
AFSPC	21SW	21 Ops Gp	7 Space Warning Sq	Beale AFB, CA																
AFSPC	21SW	21 Ops Gp	10 Space Warning Sq	Cavalier AFS, ND																
AFSPC	21SW	21 Ops Gp	12 Space Warning Sq	Thule AB, Greenland																
AFSPC	21SW	21 Ops Gp	13 Space Warning Sq	Clear AFS, AK									A							
AFSPC	460SW	460 Ops Gp	2 Space Warning Sq	Buckley AFB, CO						A										
AFSPC	460SW	460 Ops Gp	11 Space Warning Sq	Schriever AFB, CO							A									
Space control squadrons																				
AFSPC	21SW	21 Ops Gp	4 Space Control Sq	Holloman AFB, NM																
AFSPC	21SW	21 Ops Gp	16 Space Control Sq	Peterson AFB, CO										A						
AFSPC	21SW	21 Ops Gp	20 Space Control Sq	Eglin AFB, FL																
AFSPC	21SW	21 Ops Gp	20 Space Control Sq	Dahlgren NYI, VA																
AFSPC	21SW	21 Ops Gp	76 Space Control Sq	Peterson AFB, CO																
Space communication squadrons																				
AFSPC	14AF		614 Air & Space Comm Sq	Vandenberg AFB, CA																
AFSPC	30SW	30 Ops Gp	30 Space Comm Sq	Vandenberg AFB, CA																
AFSPC	45SW	45 Ops Gp	45 Space Comm Sq	Cape Canaveral, FL																
AFSPC	50SW	50 Network Ops Gp	50 Space Comm Sq	Schriever AFB, CO																
AFSPC	460SW	460 Op Gp	460 Space Comm Sq	Buckley AFB, CO; Kapaun, Germany																
Range squadrons																				
AFSPC	45SW	45 Ops Gp	1 Range Ops Sq	Cape Canaveral AFS, FL													A			
AFSPC	30SW	30 Ops Gp	2 Range Ops Sq	Vandenberg AFB, CA																
AFSPC	30SW	30 Ops Gp	30 Range Mgt Sq	Vandenberg AFB, CA																
AFSPC	45SW	45 Ops Gp	45 Range Mgt Sq	Patrick AFB, VL																
AFSPC	45SW	45 Ops Gp	45 Range Mgt Sq	Cape Canaveral AFS, FL																
AFSPC	SIDC	595 Space Gp	25 Space Range Sq	Schriever AFB, CO																
Test squadrons																				
AFSPC	SIDC	595 Space Gp	17 Test Sq	Schriever, Col Spgs Cty, Patrick AFB, Cheyenne Mt AFS, Vandenberg, Peterson, Buckley												A				
AFSPC	30SW	30 Launch Gp	1 Air & Space Test Sq	Vandenberg AFB, CA																
AFSPC	SIDC	595 Space Gp	3 Space Experimentation Sq	Schriever AFB, Bolling																
Centers																				
AFSPC	Space and Missile Systems Center			Los Angeles AFB, CA																
AFSPC	Space Innovation and Development Center			Schriever AFB, CO																
AFSPC	614th Air and Space Operations Center			Vandenberg AFB, CA			A								A					A
Training, School, NSSI																				
AFSPC	SIDC	595 Space Gp	Adv Space Ops School	Colorado Springs Cty																
AETC	2AF	381 Training Gp		Vandenberg AFB, CA																
AETC	2AF	381 Training Gp	392 Training Sq	Vandenberg AFB, Schriever AFB																
AETC	2AF	381 Training Gp	532 Training Sq	Vandenberg AFB, CA																
AETC	2AF	381 Training Gp	533 Training Sq	Vandenberg AFB, CA																
AETC	AU	Eaker Ctr Prof Dev	NSSI	Peterson AFB, CO															A	
Joint/national space organizations																				
NRO	National Reconnaissance Office			Chantilly, VA														A		

Bkl = Buckley AFB, CO; Clr = Clear AFS, AK; Cp Cnv = Cape Canaveral AFS, FL; Ptrk = Patrick AFB, FL; Sch = Schriever AFB, CO; A = ARC is associate unit
Chntly = Chantilly, VA; CoSp = Colorado Springs, CO; Grly = Greeley ANGS, CO; Ptsn = Peterson AFB, CO; Vdb = Vandenberg AFB, CA; UE = ARC unit is unit-equipped

Associate units are more common among space operations and space warning squadrons. Two of the AFRC's associate space operations squadrons at Schriever AFB work with the 50th Space Wing's 1st and 2nd Space Operations Squadrons commanding and controlling ISR and GPS satellites, respectively, and the third (unit-equipped) provides backup to NOAA for command and control of Defense Meteorological Satellite Program (DMSP) systems. The ANG's 148th Space Operations Squadron at Vandenberg operates one of three fixed command and control nodes for protected military satellite communication systems, in association with the

AC's 4th Space Operations Squadron at Schriever that operates the other two fixed nodes. AFRC's 8th Space Warning Squadron, headquartered at Buckley AFB and with a detachment at Schriever AFB, is associated with two AC space warning squadrons using Defense Satellite Program (DSP) and Space-Based Infrared Radar System (SBIRS) assets to detect missile or space launches or nuclear detonations. The AC's 11th Space Warning Squadron and its associated Detachment 1 of AFRC's 8th Space Warning Squadron, the detachment fully integrated with the 11th at Schriever, aim to provide rapid and assured theater missile warning to warfighting commanders worldwide. The ANG's 213th Space Warning Squadron is associated with the AC's 13th Space Warning Squadron; both are at Clear AFS, Alaska, operating AN/FPS-123 (PAVE PAWS).[35] None of the AC's space launch squadrons, space communications squadrons, range squadrons, or space-oriented test squadrons has an associate unit in the RC. The AC's three space-oriented training squadrons (mainly at Vandenberg) lack RC associate units, but in Colorado Springs the AFRC's Reserve NSSI is fully integrated with the AC's National Security Space Institute (NSSI), the DoD focal point for space education and training, where it also supports the Advanced Space Operations School.[36]

Only AFR's 6th Space Operations Squadron, ANG's 148th Space Operations Squadron, and ANG's 137th Space Warning Squadron have their own "unit equipment." All other RC units are associated units.

Suitability Criteria

Surge Demand

The demands for many activities in the space community are relatively constant: conducting command and control for different satellite systems, maintaining vigilance via orbiting and ground-based warning systems, tracking and reporting about space objects, and so on. Even so, reservists and guardsmen already contribute in many of those areas, providing subject-matter expertise and capacity for out-of-the-ordinary or intermittent surges—e.g., for satellite constellation changes, resolution of anomalies, or system transitions. Other activities like launches, range operations and management, system testing, and overseas deployments reflect somewhat less constant demands and, in that regard, seem amenable to RC participation during periods of more intense activity.

Steady-State Deployment Demand

Deployments for purposes of providing space-related information to warfighters, enabling theater and reachback communications, geolocating space-system jammers or other electromagnetic interference, providing theater missile warning, and supporting critical ISR capabilities have grown with joint and allied leaders' appreciation and utilization of space-related capabilities, and with opponents' potential for interfering with them. But they still represent a relatively small share of the workloads that the Air Force needs its space workforce to handle.

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[35] The AN/FPS-123 is converting to the AN/FPS-132, the Upgraded Early Warning Radar or UEWR, joining the units at Beale AFB, Thule AB, and RAF Fylingdales.

[36] All of the references to units in the preceding paragraph are as of March 1, 2012.

Squadrons with deployment demands include the 4th Space Operations Squadron; the 4th, 16th, and 76th Space Control Squadrons; and the 25th Space Range Squadron. The Space and Missile Systems Center's Detachment 1 also has mobile test and evaluation ground communications assets.

Steady-State Home-Station Operational Tempo

Space control squadrons' optempos are relatively constant (somewhat less so for the 20th Space Control Squadron); launches generate surge optempos for range operations squadrons; and optempos for launch, ops, warning, and range management squadrons fall somewhere in between. While one might guess that space launch squadrons' optempos vary substantially, they tend to even out because to a considerable degree they involve oversight of contractors; individual launch program (and associated contractors') workloads vary considerably, but oversight addresses multiple launch events simultaneously and tends to even out.

Short-Duration Activations

AFRC tours for 13S officers averaged about averaged 58 days in FY2011, and about 64 days each for 1C6 enlisted space specialists, compared with only about 9 and 12 days, respectively, for the ANG. Most drilling RC members work at their home bases during relatively short activations, a situation especially advantageous for local AFRC and ANG members.

Continuation Training Requirements

Mission-ready monthly recurring training is required in space units, somewhat akin to the RAP for aircrews, but qualifications are certified by position rather than by task—e.g., crew commander versus crew chief versus operational crew in a space warning squadron. Nominally, members must complete two "proficiency shifts" per 30 days[37] in order to maintain certification, plus simulator or systems training every 30 days, classroom training quarterly, and evaluation annually. The certification requirements are the same, regardless of component.

Readiness

As in the other functional areas, we found no reason to characterize RC space units as notably less ready than active units, although their designed operational capability response times are somewhat longer, reflecting their need for a little extra time to assemble their part-time personnel. RC space units undergo the same operational readiness inspections as active units.

Sustainability

In FY2012, the AC accounted for about 90 percent of 13S officers and 73 percent of 1C6 enlisted personnel, both above the 2:1 ratio (67 percent) that we have adopted as a threshold for somewhat unsuitable and far above the 1:1 ratio (50 percent) regarded as very unsuitable. The 13S C-shred (missile combat crew) is 100 percent in the AC, so the rest of the shreds and the unshredded portion average less than 90 percent in the AC: A (satellite command and control) 74

[37] Many positions require proficiency shifts only every 45 days, but the requirements usually are managed monthly instead.

percent, B (spacelift) 88 percent, D (warning) 85 percent, E (surveillance) 73 percent, and the unshredded portion 97 percent. That is, the AC apparently offers substantial populations for sustaining even larger numbers of RC space specialists. Even so, substantial shares of newcomers to RC space units, even personnel with prior active-component experience in space/missile specialties, arrive without specific experience in their new units' systems. We note, too, that relative dearths of civilian employment opportunities near many space units make it more difficult to attract and retain drilling reserve and guard members—e.g., near Cavalier AFS, ND; Holloman AFB, New Mexico; New Boston, New Hampshire; or Thule AB, Greenland.

Availability

The AFRC used only about 47 13S officer MPA man-years and 12 1C6 enlisted man-years during FY2011, and the ANG used about 21 and 19 man-years, respectively. Even units and activities that deploy worldwide could spend more time within the 1:5 deploy-to-dwell ratio mandated for the long term.

Overseas Basing

The vast majority of the AC's officer and enlisted space jobs are in the United States, and so are suitable for the RC in that respect.

Civilian Competencies

Civilians, especially contractor personnel, provide important ongoing capabilities in some space functions (e.g., launch, satellite operations, and surveillance) but not in others (e.g., warning, or offensive or defensive control operations). To the extent that part-time reservists and guardsmen hold relevant jobs in the civilian space sector, they can accumulate and maintain expertise that is especially valuable for current or potential military roles. As in the RED HORSE and cyber areas, the Air Force could consider using sponsored reserves in the space enterprise—i.e., requiring minimum numbers of reservists and guardsmen among contractors' staffs to ensure wartime availability of key contractor capabilities.

Relevance to State Missions

Most Air Force space activities are dedicated to DoD-wide, federal, and international purposes, not closely or especially connected with state missions.

Organizational Constructs

The networked characteristics of most space systems would seem to favor organizational constructs that marry RC manpower to AC equipment (i.e., classic associations and IMAs).

Conclusion

The AFRC's and the ANG's roles in the space mission areas have grown over the past decade and show additional potential for growth, probably especially in range operations and deploying space control squadrons. However, the legal requirement that technician, AGR, and Reserve Personnel Appropriation–funded part-time reservist and guardsman duties focus on training and administration of reserve forces, not on ongoing operations, greatly reduces the cost advantages of placing this mission in the RC.

4. Conclusions and Recommendations

Of the missions we examined, we found only one (the RPA LRE mission) that is clearly a poor fit for the RC. However, we found that several missions are rendered less suitable for the RC by policies or practices that can be changed. We have also found that cost—which in a resource-constrained environment should be an important consideration in determining the suitability of a mission—is seldom depicted in a way that allows decisionmakers to use it as a criterion in incrementally adjusting mission assignments. Toward that end, we offer a recommended approach to assessing the costs of AC and RC force structures and to finding mission assignments that produce needed outputs at minimal cost. Finally, we recommend rethinking several aspects of the way the RC is organized for association with AC units. Specific recommendations are summarized below.

Shift Force Mixes to Best Match Demands

Because of the significant deployment and/or overseas basing assignments likely to be associated with the RPA LRE mission, we recommend avoiding assignment of that mission to the RC. We also recommend reevaluating the costs associated with assignment of space and cyber missions to the RC, where a lack of surge and continuation training requirements suggest a low likelihood of cost-effectiveness. Beyond that, all else equal, we recommend shifting the mix toward the RC in missions with heavier surge demands and toward the AC in missions with heavier steady-state deployment or home-station optempo demands.

Change Policies and Procedures to Better Influence Outcomes

Man-Days

In some missions, RC units are able to execute at a lower cost per output than AC units. There are potential savings to be realized by reducing AC outputs and increasing RC capacity through additional man-day allocations. Current man-day allocation processes, however, generally provide man-days to be used only when AC resources are not readily available. We know of no process that systematically sets the level of man-day allocations and programmed AC and RC capacities using cost minimization as an objective. We recommend further efforts to develop and implement such processes. With such processes available, it might then make sense to provide some man-days as a baseline annual allocation to RC units rather than on a task-by-task basis. In return for this allocation, RC units might be required to make annual commitments to supporting active operations.

Administratively, AFI 36-2619, which governs management of the Air Force man-day program, outlines procedures for man-day requirements but does not mention a revised, needs-based assessment of the steady-state requirement within the Air Force Corporate Structure. Also, the instruction does not mention separate procedures in place for managing OCO man-days. We recommend that the instruction be expanded to reflect current practice and/or the modified practices discussed above.

Statutory Restrictions on Use of Technicians, Active Guard and Reservists, and Reserve Personnel Appropriation Funding

As discussed in Chapter Two, we explained that technician, AGR, and Reserve Personnel Appropriation–funded part-time reservist duties are required by statute and appropriations language to be focused on training or administration of reserve forces. For missions that do not require continuation training, this makes the RC a rather expensive resource for meeting surges in operational demands. To make the RC less expensive and hence more attractive for these missions, the applicable statutes and the language of future appropriations bills could be modified to explicitly authorize (or at least not so explicitly restrict) the use of these personnel to meet operational requirements. The language might specify, for example, that Reserve Personnel Appropriation–funded manpower may be used for operational purposes for the balance of standard drill periods and active duty for training tours that are not actually needed to maintain individual or unit proficiency.

If Reserve Personnel Appropriation–funded manpower becomes more readily available to meet operational needs, it will likely focus attention on the practice of paying for two drill periods in one day—essentially, two days of pay for one day of work. To allow what are now considered drill days to be dedicated to operational duties, this compensation scheme might need to be revisited.

The 11th Quadrennial Review of Military Compensation (Department of Defense, 2012) made recommendations regarding reserve duty status and compensation that are consistent with these two recommendations. The review's recommendations focused on streamlining and simplifying outdated structures that inhibit volunteerism and efficient use of reservists and guardsmen and also create some inequities among reservists and guardsmen and between the AC and the RC. Our recommendations focus on making the RC more cost-competitive with the AC, which would reduce overall defense costs and make the cost-minimizing force mix tilt more toward the RC. The fact that both sets of considerations coincide makes these recommendations especially compelling.

Cost Assessments

Cost is a fundamental consideration in force mix deliberations, but consensus is lacking on a common approach to incorporating cost into these deliberations (DoD, 2012). In the interest of moving toward a common approach, we offer the following as a recommended framework.

The cost of military capabilities is driven by a combination of force structure (the equipment and personnel that comprise operational units) and the tempo of operations of that force structure. For comparably equipped units, higher optempos will drive higher costs. Since AC units can and generally do operate at higher optempos than RC units, they will generally appear to be more expensive on a per-unit-per-year basis.

The products or outputs of military capabilities are also a function of force structure and optempo. The higher optempo of AC units can be measured, for example, in terms of flying hours, steaming days, or tank-miles per year, or in their more frequent and/or lengthier deployments to theaters of operation to meet combatant commander needs. Cost can and should be considered on a per-output basis. The most efficient force mix is the one that satisfies various output demands at the lowest total cost.

We visualize three kinds of output demands that need to be met. The first is to provide force structure that is large enough, assuming planned levels of mobilization and surge-level optempos, and available at an appropriate level of readiness in a timely enough way, to meet the strategic scenarios deemed appropriate for sizing the force. The second is to provide force structure funded for and capable of sustaining operations over a long period of time to meet expected ongoing, peacetime, and post-surge demands. The third is to maintain or restore the readiness of force structure through continuing or just-in-time training. We can refer to these three types as *strategic*, *operational*, and *training* demands.[38]

The components differ in their costs of producing the outputs that meet these demands. By operating at lower tempos, RC units provide force structure to meet strategic demands at a lower cost than AC units. But their lower optempos also give them more limited capacity to support ongoing operational demands. In some cases, RC units have more experienced personnel than AC units and therefore need less training to maintain readiness. In other cases, RC units may have less experienced personnel and therefore need more training.

When faced with the need to minimize something (cost) while satisfying multiple demands using multiple resources (components' units) with varying costs, the appropriate analytic approach is optimization modeling. Since many of the variables required in these analyses are multiplicative (e.g., number of flying hours produced by AC units is a product of the number of aircraft in the AC and the number of flying hours per AC aircraft, with both aircraft and flying hours being variable), optimizations generally must be nonlinear. Additionally, since timely availability is an important consideration for meeting strategic demands, a time dimension is often needed in the models.

These analyses will depend critically on assembling necessary information. First among the information requirements is a set of clearly defined strategic, operational, and training demands, along with any applicable timeliness requirements. The second is a clear understanding of the relationships between force structure, optempos, and costs. This understanding should include not just the direct costs of the operating units, but also the capital and indirect costs (such as garrison support costs) incurred to sustain them at the required optempos. Third, a clear understanding is needed of the relationships between force structure, optempos, and outputs. Finally, maximum feasible optempos of the components must be understood in order to properly constrain the optimizations.

The level of aggregation for a cost analysis is another important consideration. We suggest that these analyses are most informative if done at the level of a broadly defined operational mission, such as providing various kinds of fighter or mobility capabilities or various types of brigade combat teams. At the risk of losing some optimality, but to greatly facilitate force

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[38] As elsewhere in this document, we are referring to continuation training performed in operational units rather than undergraduate, replacement training unit, or initial skills training.

structure decisionmaking, the analysis might be done at the level of a major design, e.g., C-130, F-16, or KC-135, or light versus heavy brigade combat teams.

The approach described here is likely to be costly to create and sustain. Partial or less costly analyses may be possible by ignoring some factors deemed less critical, by accepting less rigorously derived relationships, or by considering discrete cases rather than optimizations with continuously varied inputs and outputs.

Review and Revise Organizational Constructs

We find two organizational constructs—classic associations and IMA utilization—with anachronistic characteristics that make them more expensive and/or less effective than they could be.

Classic associations generally pair an associate wing with a host wing. But since units are not mobilized and deployed as wings, garrison wings are not relevant to presentation of forces. Moreover, since one wing is sufficient to manage local organizing, training, and equipping matters, much of the associate wing and its groups are redundant. A single wing with more integrated AC and RC elements would reduce costs and facilitate coordinated employment of AC and RC resources.

IMA utilization tends to provide thinly spread resources as a strategic reserve. To become more relevant as an operational reserve, to fully exploit other potential advantages, and to provide better integration of AC and RC resources, we recommend migration from classic associate units to IMA elements in missions, typically non-flying, where tasks cannot be readily fragmented and assigned to separate AC and RC squadrons. When separate AC and RC squadrons make sense, we recommend migration away from parallel wing and group structures. Most non-flying missions, and perhaps also the maintenance and support functions embedded in flying missions, would benefit from this evolution. Since an IMA construct is applicable to AFRC but not the ANG, this evolution could, unfortunately, make the ANG a less suitable partner for many missions.

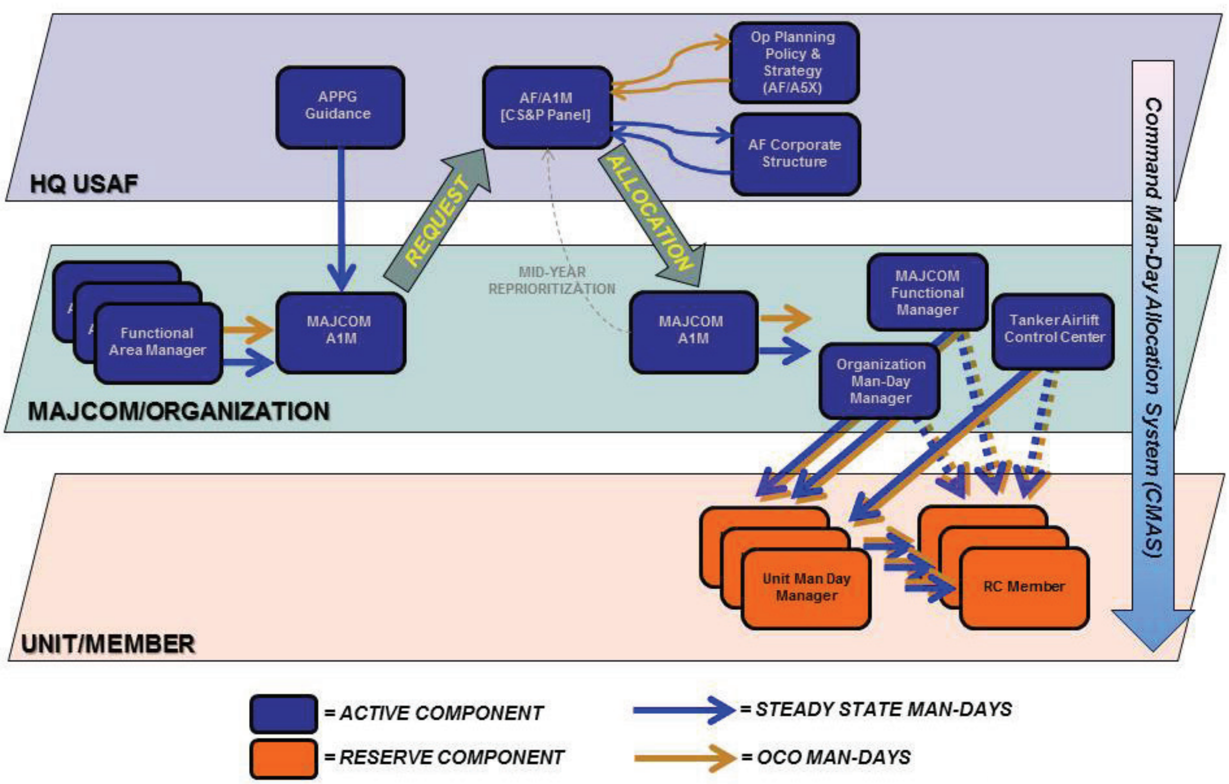
In the F-16 mission, Robbert (2012) found that the current force mix can meet surge, steady-state, and continuation training requirements in a near-cost-optimal way. However, the current mix does not provide sufficient absorption capacity to sustain total pilot requirements. A solution, parts of which are currently in a planning stage, is available via use of active and classic associate units to shift experienced and inexperienced pilots between AC and RC units. We recommend establishing sufficient active associate units containing predominantly inexperienced pilots to resolve most absorption shortfalls. We also recommend establishing sufficient classic associate unit or IMA arrangements to resolve the remaining absorption shortfall by reducing total AC pilot requirements.

Appendix A. MPA Man-Day Management and Utilization

A New Process

Beginning in FY2012, the Air Force implemented a new process for requesting and allocating steady-state and OCO man-days for FY2012 and subsequent years. Figure A.1 outlines the new process. MAJCOMs and agencies rely on their functional managers to report anticipated capability shortfalls where RC support is required. Each MAJCOM/agency has its own process for gathering man-day requirements from subordinate organizations and functional managers and then prioritizing these inputs prior to submission to Headquarters Air Force, Deputy Chief of Staff for Manpower, Personnel and Services (AF/A1). Some MAJCOMs staff MAJCOM-wide prioritizations of the use of man-days, while others rely on their A1 staff to consolidate and review. The Headquarters Air Force, Director of Manpower, Resources, and Organization (AF/A1M) provides a submission tool that allows MAJCOMs to establish their own weighted factors and scores to determine where or what are their unique mission requirements.

Figure A.1. Man-Day Request and Allocation Process



MAJCOMs are required to categorize their steady-state man-day requests within the following priorities (* indicates those areas that are OCO funded):[39]

1. Support for Air Expeditionary Force(s) AEF rotations.*
2. Support for the operational requirements for continuing/enduring missions. (These missions are performed at the wing/operational level).*
   a. Total Force Enterprise missions; for non-AEF established total force integration (TFI) or other documented associated missions
   b. Unit equipped augmentation requirements
   c. RC capability not in the AC.
3. Support for operational requirements in new and emerging missions (e.g., cyberspace, remote piloted aircraft support). (This category is used at the unit/wing/operational level.)*
   a. Direct support of Nuclear Deterrence Mission
   b. Direct support of ISR
   c. Direct support of cyber operations.
4. Support for domestic contingencies not requiring outside CONUS deployment (e.g., Operation Noble Eagle) (This category is at the operational level).*
5. Support for Building Partnerships (BP) or Building Partnership Capacity (BPC) events and Combatant Commander (CCDR) exercises. (This category is used in support of the COCOM.)
6. Funded with reimbursable funds.
7. Short-term augmentation of AC missions.
   a. Honors and Funeral Support
   b. Medical/Legal Continuation
      i. Critical skill short-term support (must be on critical skill list) – operational level
      ii. Critical skill short-term support (must be on critical skill list) – MAJCOM/numbered Air Force (NAF)
      iii. Critical skill short-term support (must be on critical skill list) – Air Force level
      iv. Critical skill short-term support (must be on critical skill list) – COCOM level
   c. Exercise and training support for AC.
   d. Education support
      i. Other short-term support – operational level
      ii. Other short-term support – MAJCOM/NAF level
      iii. Other short-term support – AF level
      iv. Other short-term support – COCOM level.

Through the APPG, the AC is signaling the areas it considers most important for RC contribution. Support for domestic contingencies is an area where the RC has traditionally contributed. However, by making man-days for operational enduring/emerging missions a high priority, the AC is indicating that the RC should continue to be used as an every-day operational

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[39] List provided by Air Force Strategic Sourcing Division (AF/A1MS).

force. A panel composed of AF/A1M, Air Force Directorate of Operations (AF/A3O), Office of the Deputy Assistant Secretary of the Air Force (Budget) (SAF/FMB), Office of the Deputy Assistant Secretary of the Air Force (Force Management Integration), (SAF/MRM), Chief of the Air Force Reserve (AF/RE), and the National Guard Bureau (NGB) reviews the requested man-days and justifications to ensure the intent of the MPA man-day program is met and duplicates are eliminated.

Annually the AF uses criteria outlined by the Office of Management and Budget (OMB) to verify and validate the war effort supplemental funded requirements. Commands and agencies submit war effort requirements to the Air Force Corporate Structure based on OMB guidance. Once submissions from the MAJCOMs for OCO man-days are received, AF/A1M and Air Force Directorate of Operational Planning, Policy, and Strategy (AF/A5X) coordinate and validate the inputs against OMB guidance. Additional criteria, such as deployment requirements, direct support and backfill for AC members, are used to stratify the man-day requirements. Recommendations are prepared and presented to the Air Force Personnel and Budget Review Committee (PBRC) for funding.

MPA man-day resources, both steady-state and war effort, are distributed in accordance with these Air Force-level funding decisions. Allocations are then updated if congressional appropriations differ from the President's Budget request. Once man-days are allocated to the MAJCOMs, functional managers or other subordinate activities receive this allocation. At AMC for example, a large portion of the man-day allocation goes to the 618th Air and Space Operations Center's Tanker Airlift Control Center (TACC). AF/A1M is responsible for monitoring, tracking and reporting the execution of the steady-state and war-effort MPA man-day accounts. They also perform a mid-year review and obtain PBRC approval for re-distribution of man-days.

The Command Man-Day Allocation System (CMAS)

The Command Man-day Allocation System (CMAS) is used to allocate and track execution of man-days. Prior to 2008, CMAS was used primarily in ACC and AMC. In 2009, it was exported to all MPA man-day users.

Our review of CMAS data uncovered significant problems. We found that, in recent years, CMAS failed to capture many individuals mobilized involuntarily, although they are paid from MPA man-day allocations. See specific data on this in our discussion of Figure A.4. Additionally, for some time after CMAS was exported to all man-days users, there were no standards for data entry. For example, duty location was a text entry with inputs that included 4-digit personnel accounting symbol (PAS) codes, zip codes, the word "unit," or the name of a unit. Similarly, AFSCs are entered with varying degrees of detail. There have been ongoing attempts to update CMAS to standardize and expand data, which will significantly improve the extent and accuracy of future man-day analyses; we noted significant improvements in the FY2011 data accuracy over the FY2009 data.

Individual/Unit Considerations

We found two types of RC members who serve MPA man-days: ARTs and traditional reservists and guardsmen.[40] Some traditional guardsmen have civilian jobs and therefore have limited opportunities to use man-days, while others with no civilian job are eager to serve as many man-days as possible. These differing levels of participation can make the management of a unit difficult, since operational experience is not evenly distributed. In the present economic climate, there is a larger pool of available RC volunteers looking for consistent employment for both pay and benefit purposes.

Given a projected reduction in man-day availability, particularly OCO-funded man-days, those who have relied on man-days as their primary source of income may find that there are not enough opportunities to allow them to continue without a civilian job. On the other hand, some reservists and guardsmen we interviewed believed it was currently necessary to have extensive deployment experience to be promoted in the RC. They would like to see a return to a more traditional use of the RC so that it is possible to balance a job in the civilian sector with their reserve obligations. Further, these reservists and guardsmen believe that the RC may be missing out on individuals with specialized skills because they cannot serve more than one weekend a month.

Reserve Component Participation in the Man-Day Process

Predictability and advance notice are the keys to RC participation. We heard this from unit level reservists and guardsmen, host and associate schedulers, wing commanders, and MAJCOM/A1 staffs. Allocating additional man-years to the RC could increase participation in certain mission areas and functional areas, but only at times when RC individuals are willing to serve. Every attempt should be made to give the RC missions and duties that are stable, predictable, and suited to their part-time commitment. Programs that take into account the ability of RC individuals to participate can increase the number of man-days served. For example, the Reserve Aircrew Posturing program gives reserve associate crews more stability when volunteering to fly AMC missions. At C-17 associate wings, individuals can sign up for blocks of time, usually 7–10 days. If approved, they are guaranteed man-days for that time period. This program fosters volunteerism by guaranteeing crews that if their mission is cancelled prior to execution, they will still be paid. Many AMC crews work for the airlines, and once they project that time off, they can't easily change their civilian work schedule.

An issue with the use of RC assets is the cost resulting from a volunteer model of filling deployment taskings. While the AC has gone to a standard 179-day deployment, the RC often agrees to take a rotation and then projects multiple personnel to fill the 179-day requirements with shorter rotations (for example, six 30-day deployments). This situation occurs both in aviation and support taskings. This is an inefficient method of filling taskings, since the MAJCOM incurs additional man-day costs for in/out processing, pre-deployment training, travel, leave, and reconstitution.

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[40] Another type, AGRs, is considered full-time and therefore cannot be dual-compensated using man-days.

Major Command Perspectives

AMC and ACC are the heaviest users of man-days, together using 68 percent of the available man-days in FY2009–2011 (see Figure A.5). We discussed the specifics of the man-day program with their headquarters staffs as well as with representatives of three units who are users of man-days.

Air Combat Command Perspectives[41]

- ACC senior leadership has made it clear that the AC directs the level of RC contributions. The AC uses the RC only after the AC has reached its capacity
- MPA man-days have become a constraint on utilization of the RC. With more man-days, the ACC staff believe they could use the RC more.
- Moving force structure to the RC drives increased reliance on man-days to meet the AC's Air Force/COCOM taskings.
- When at home station and used as a reserve to AC capabilities, the RC is significantly cheaper; however, when activated under current policies and guidance, the RC costs as much and at times significantly more than AC forces.
- In FY2011, ACC linked ACC Directorate of Operations' (ACC/A3's)Consolidated Planning Schedule (CPS) for Combat Air Forces (CAF) to the man-day planning process. This ensures that man-day requests are synchronized with RC units that are tasked in the AEF and global force management (GFM) process.
- AC operational needs are constantly shifting; however, changes to the RC's planned contribution can bring complaints and political interference. ACC reports incidents where budgetary requirements drove them to fill a tasking with AC assets, but the influence of a state Adjutant General forced the transfer of the mission to the RC—an unnecessary use of man-days.
- Data in CMAS is not easily accessible for analysis. CMAS reports are limited in scope, and MAJCOMs do not have access to all data fields in CMAS.
- The ACC man-day manager summarized the situation as: "The RC is constantly offering capability as long as the AC can pay for it."

Air Mobility Command Perspectives[42]

- Continuously have more mission requirements than we have crews to fly them; not enough AC crews and RC volunteer crews to meet every mobility requirement.
- It is the responsibility of the AC to identify when their capability is exceeded and augmentation is required.
- The AMC man-day manager summarized their situation as: "The RC merely needs to make more crews available in order to vocalize the desire for increased participation."

[41] Communication with ACC/A1M, January 25, 2012.
[42] E-mail communication with AMC/A1, February 6, 2012.

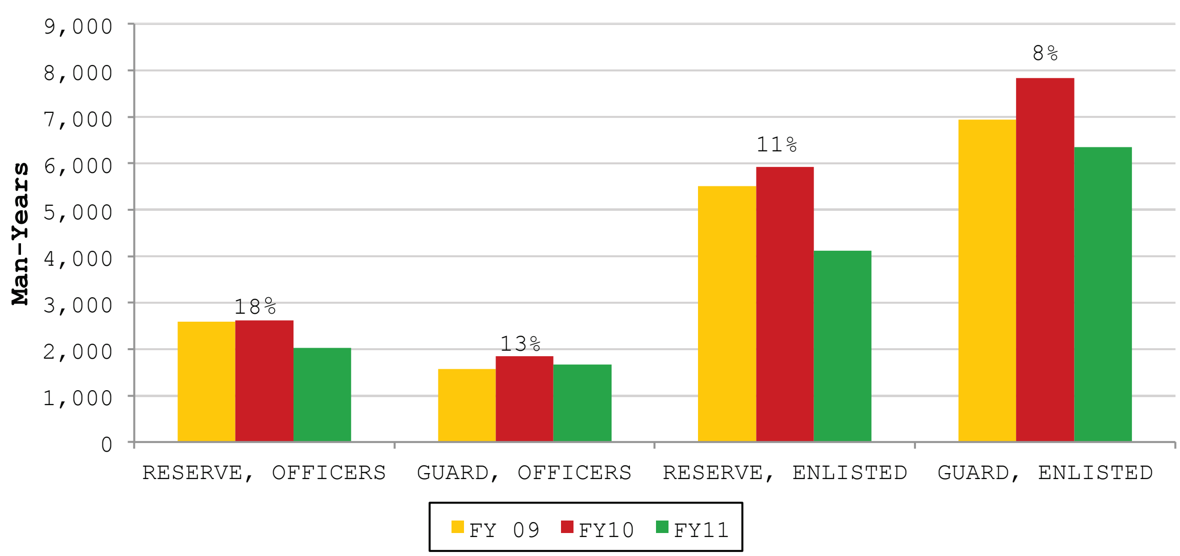
Mobility Operations

Given the large number of man-days used for mobility operations, we interviewed Tanker Airlift Control Center (TACC) staff members. The RC Mobility Manager, TACC/XOB, is the single point of contact for all AMC-gained AFRC and ANG flying units to meet the AMC mission requirements that exceed AC capability. This office deals with RC units on a daily basis to ensure timely, accurate and efficient processing of over 400 man-day request per week.

Man-Day Utilization

All man-day data discussed in this section is from CMAS, covering FY2009 through FY2011. For that time period, an average of 18,200 man-years were used by the RC (4,300 steady-state and 13,900 OCO-funded) for an average annual cost of $1.827 billion. Figure A.2 shows the man-years for AFRC and ANG officers and enlisted across those FYs. The percentages above the bars represent the portion of man-days served of the total man-days available in the population (after the required 39 days of training for RC members).

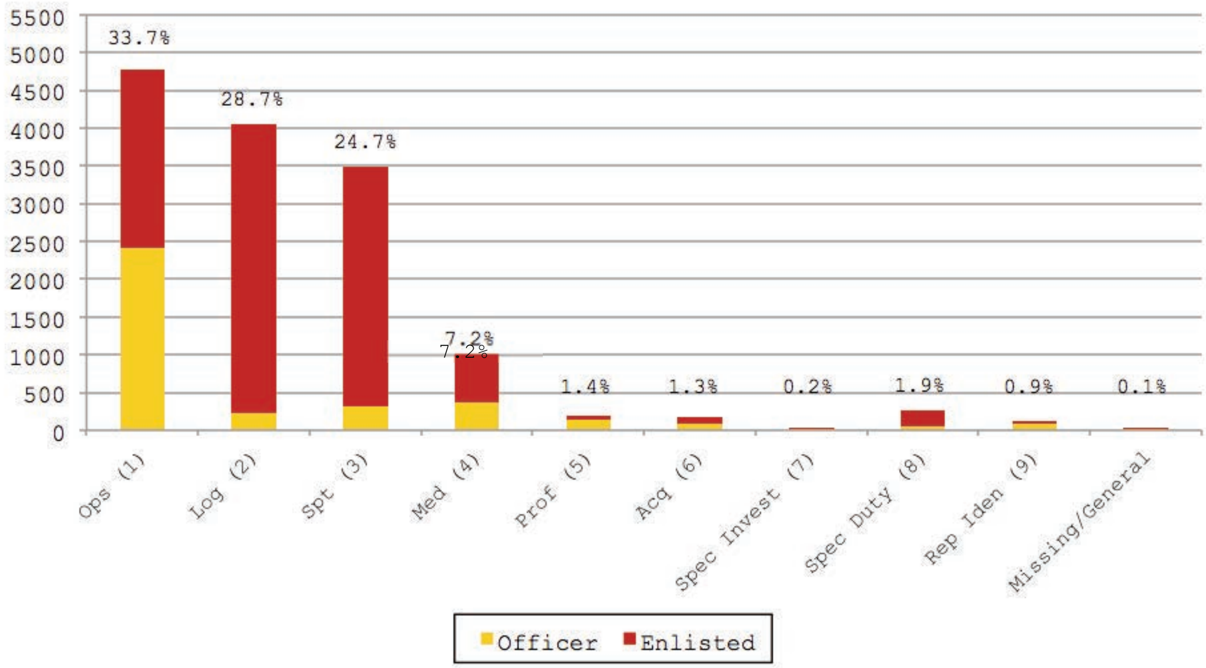
Figure A.2. Man-Years by Component/Type



Distribution by Air Force Specialty Code

Figure A.3 shows the man-years for FY2011 by the first digit of the AFSC of the individual serving the man-day tour. Eighty-seven percent of man-days are served by individuals in operations, logistics, and support functional areas.

Figure A.3. Man-Years by Officer/Enlisted, FY2011



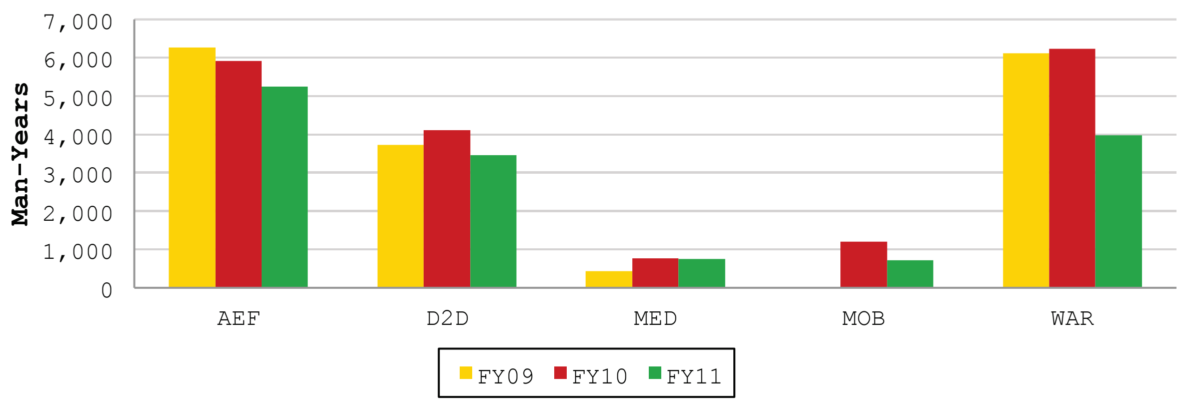
Distribution by Type of Duty

Figure A.4 shows the type of man-day served by FY. CMAS users must categorize man-days as:

- AEF: man-days supporting Air Expeditionary Force taskings either as a deployed participant in an AEF, or as backfill for an active duty member serving in an AEF.
- D2D: Critical peacetime regular force augmentation, primarily steady-state operations.
- MED: RC individuals who are on active duty for more than 30 days and are hospitalized can be continued on active duty for the duration of their hospital stay or until no further improvement to their medical condition is expected.
- MOB: individuals mobilized; however, not all mobilizations are entered into CMAS. AF/A1M reports 4,823 man-years in FY2011 were due to mobilization, but CMAS reports only 759.
- WAR: Critical wartime regular force augmentation; those man-days served in support of named war operations.

These categories do not neatly divide into steady-state man-days and OCO man-days. For example, what is considered "WAR" has changed from FY2009 to today, and some AEF man-days may have been served in support of wartime operations.

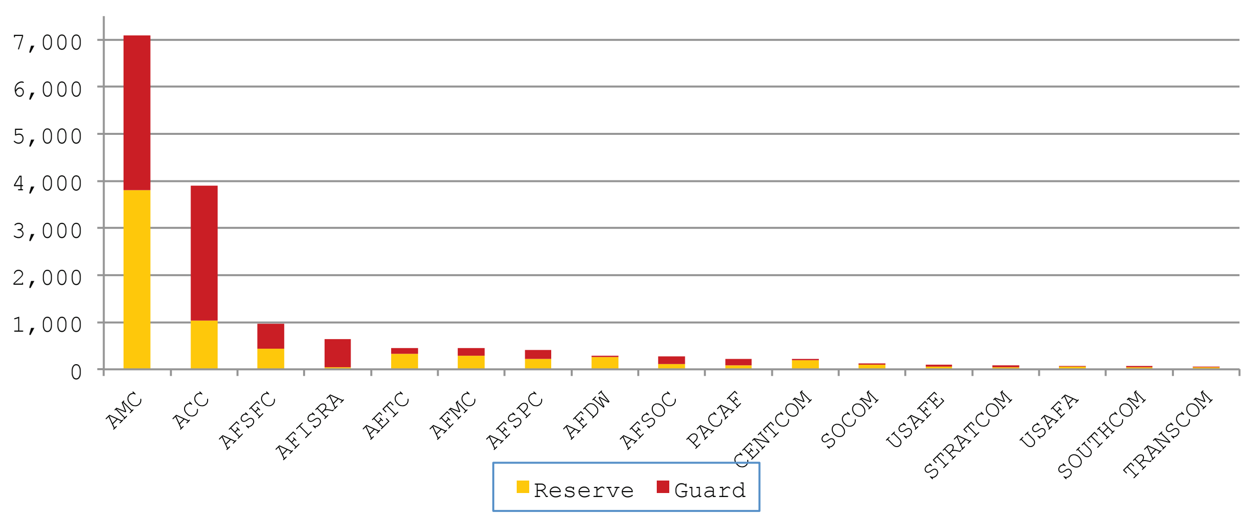
Figure A.4. Man-Days by Type and FY



Distribution by Major Command/Combatant Command/Agency

Figure A.5 shows the number of man-days by supported command (MAJCOM, COCOM, or agency) for FY2011. AMC and ACC account for 68 percent of all man-days.

Figure A.5. FY2011 Man-Days by Supported Command



Distribution by Tour Length

One or two-day tours are the most frequent. Figure A.6 shows the FY2011 number of tours by tour length for AFRC, and Figure A.7 shows the data for the ANG. For AFRC, 10 percent of the tours are less than or equal to one day, 39 percent are less than or equal to 3 days, and 68 percent are less than or equal to 30 days. For the ANG, 16 percent of the tours are less than or equal to one day, 30 percent are less than or equal to 3 days, and 61percent are less than or equal to 30 days. Reviewing the data, one might wonder whether a one-day tour is a productive use of a man-day. However, one-day duty can consist of pilots sitting alert or satellite operators manning a 24/7 operation. Some types of duty are particularly well suited to a single man-day; for example, an average of 81 man-years are served annually on honor guard duty.

There are spikes at tour lengths of approximately 30, 60, 90, and 120 days that coincide with fractions of AEF deployment lengths. There is also a spike at 365 days of duty, representing 879 tours for the RC; the majority classified as “WAR.”

Figure A.6. FY2011 Man-Day Tour Lengths—Air Force Reserve Command

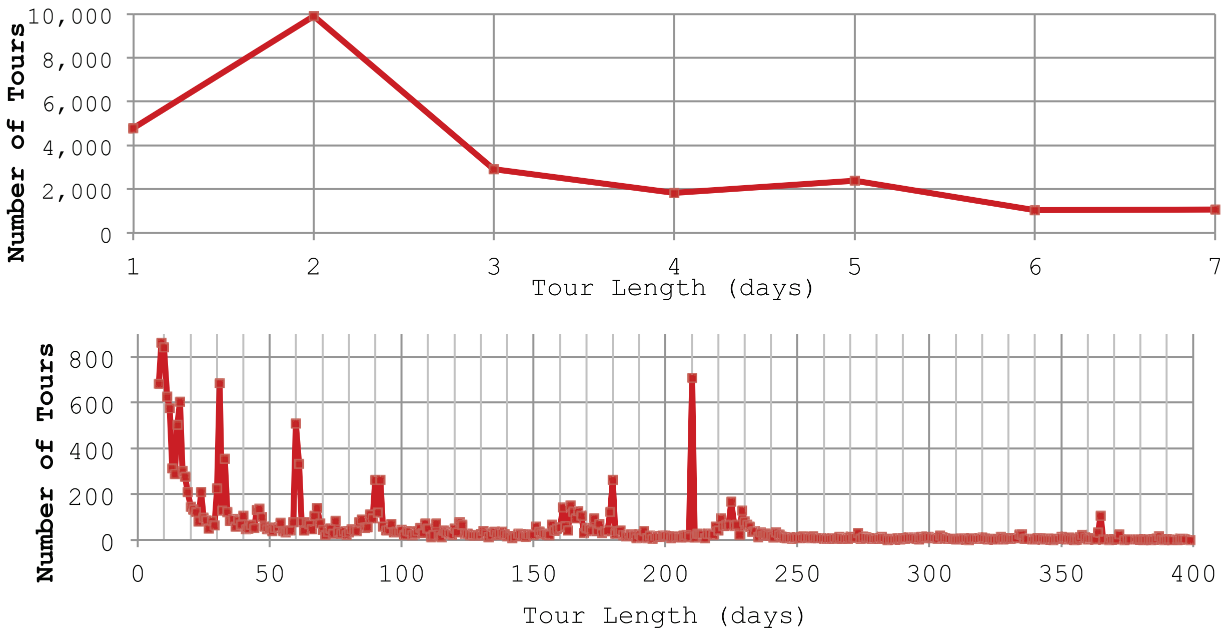
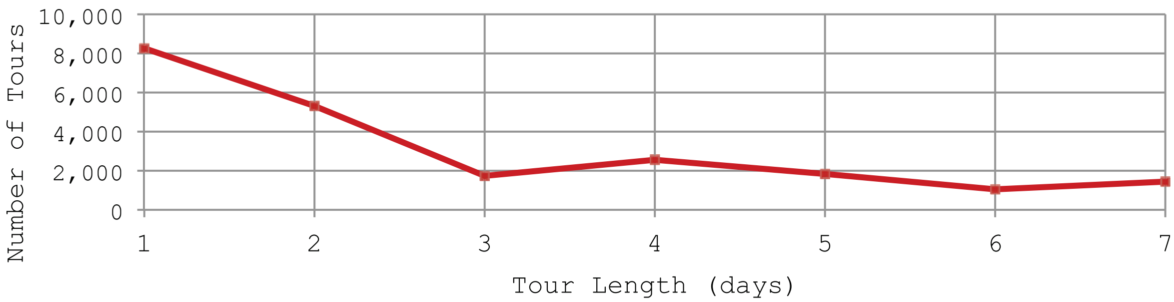
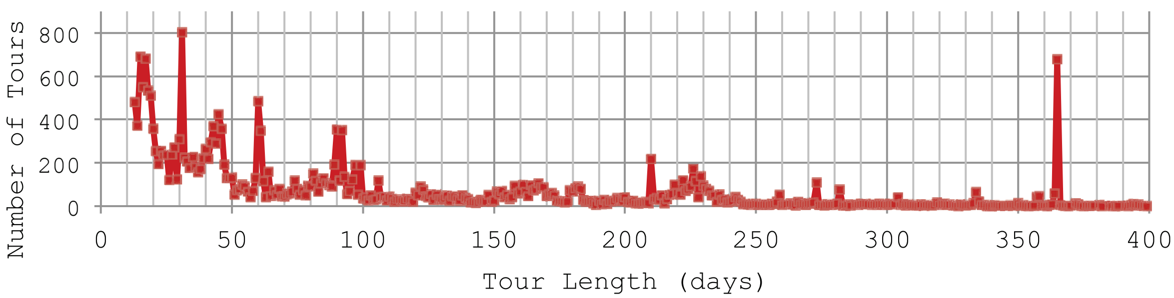


Figure A.7. FY2011 Man-Day Tour Lengths—Air National Guard





Observations and Concerns

The following observations and concerns were derived from our review of man-day requirements and distribution processes:

- Most of those involved in the man-day process are active duty personnel and organizations); there is no indication whether the RC can support a man-day request until it is allocated to the MAJCOMs and they attempt to find an individual to fill it.
- Interviews with MAJCOM A1 staff and functional managers revealed many subtleties in accessing available Guard and Reserve personnel, and the process relies on personal networking within various functional communities.
- There are two separate processes for requesting, justifying, and allocating man-days, depending on whether the requirement is to be funded through the baseline or supplemental funding, with no coordination between the two processes.
- The man-day request and allocation process is a centralized request once per year, with decentralized allocation throughout the year.
- Despite the fact that the APPG prioritizes continuing/enduring missions, such as total force enterprise (TFE) initiatives and/or emerging mission requirements, the man-day allocation process does not currently support a large mid-year man-day allocation to support such pop-up requirements.
- In a fiscally constrained/drawdown environment with accompanying reductions in end-strength, the Air Force Corporate Structure seeks to reduce MPA funding, which therefore reduces the available man-days for the RC.

- The distribution of man-days to units/individuals is not centralized across the RC; the process relies on MAJCOM functional area manager (FAM) relationships with RC units/individuals. This can result in suboptimal man-day usage and an uneven distribution of man-days for units/individuals.
- AFI 36-2619, *Military Personnel Appropriation (MPA) Man-Day Program* (July 22, 1994), does not address OCO man-days, and supplemental funding and does not include the current process of steady-state man-days.
- MAJCOMs must express their requirements for man-days by the individual AFSC needed rather than some number of man-days for a particular mission or responsibility. It can be difficult to predict the number of man-days per AFSC more than a year in advance.
- The requirement and allocation process is not transparent. MAJCOMs submit their requests, but have no systematic way to appeal for more man-days.
- There is an overall "AC first" philosophy in the man-day allocation process that accurately reflects the fact that man-days are only to be used if the capability does not exist in the AC.

More Observations

- The steady-state man-day program alone does not support today's Total Force requirements.
- The current man-day database (CMAS) does not support detailed analysis. Additional data elements/error checking is required to analyze RC's most effective contribution.
- Man-day program changes to mobility missions have the potential for greatest impact on RC participation.
- Ongoing TFE programs rely on additional MPA man-days for execution.
- Man-day execution depends on volunteerism and volunteer availability is difficult to assess; may require polling individual units/functional area.
- If the AC allocated more man-days to the RC, there is capacity for increased operational contribution.
- Not all steady-state man-years are executed in a given FY; for example, in FY2011 3,799 of 4,260 man-years (89 percent) were executed.
- The true requirement for steady-state man-days is not being assessed; rather, budget considerations are setting the limit on man-days. For FY2012, more than 10,000 man-years were requested by MAJCOMs and agencies, while only 3,750 were approved by the AFCS—the rest were accepted as risk.
- The AF/A1M position is that in most cases the RC is more expensive than employing the AC; while the pay may be nearly equivalent, travel, per diem, and the added overhead support given to reservists and guardsmen makes the RC more costly. AF/A1M's viewpoint is that while the AC struggles to operate effectively within tightening fiscal and force structure constraints, the RC simultaneously offers itself as available, often at a higher cost.

Appendix B. Memorandum Regarding Restrictions on Reserve Component Duties

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

19 July 2013

MEMORANDUM FOR AF/A1XX

FROM: AF/JAA

SUBJECT: Legal Review – Allowing Reserve Component (RC) Members to Provide Force Support Squadron (FSS) Services to Active Component (AC) Members

This responds to your request for our legal opinion about allowing reserve component (RC) Force Support Squadrons (FSSs) to cut contingency, exercise, and deployment (CED) orders and provide other support services to active component (AC) members. As explained in more detail below, we conclude that **under current law** there are **four circumstances** in which RC members **may provide** FSS services to the AC:

(1) Drill-status, full-time National Guard duty (FTNGD) and full-time support (FTS) RC members in duty status under Title 32 of the United States Code (USC):
(a) may perform FSS services for training, even if doing so **incidentally benefits** AC members and
(b) may perform a **de mimimis** amount of FSS services to AC members;
(2) If the FSS mission is formally assigned to the RC, FTS RC members in duty status under Title 10 of the USC[1] may provide the full spectrum of FSS services to AC members, as long as those services **do not interfere** with the FTS members' primary duties;
(3) RC members in a total force integration (TFI) unit may provide **proportionate services** to AC members; **and,**
(4) RC members in **active duty** operational support (ADOS) status **under Title 10** of the USC (ADOS-AC) may provide the full spectrum of FSS services to AC members.

This opinion has been coordinated with the offices of the National Guard Bureau (NGB) Judge Advocate (JA) and Secretary of the Air Force, Deputy General Counsel for Intelligence, International and Military Affairs (SAF/GCI).

Background and Question Presented

As we understand it, AF/A1 offices are currently working to consolidate three personnel computer systems into one to improve customer service, streamline work effort, and save money (the initiative is known as the "3-to-1 project"). In addition, as the AC and RC integrate and combine efforts toward a shared mission through TFI associations and other less formal constructs, component-specific offices are redundant and cumbersome. Ideally, through this 3-to-1 project, AF/A1 will

[1] For purposes of this memo, this category will only include Air Force Reserve members, because ANG AGRs who work at the unit level are only in Title 32 duty status. Title 10 ANG AGRs work at headquarters, the Air National Guard Readiness Center (ANGRC) and the Pentagon.

establish a single, customer-focused FSS providing support to Total Force Airmen. Another way to describe the objective is to establish FSS "One-Stop-Shopping" for every Airman, in any component, anywhere in the world.

Assuming all technological barriers to this effort could be overcome, you have asked whether there are any legal barriers to attaining this objective. More specifically, you would like to know whether the law will allow Air National Guard (ANG) and Air Force Reserve (AFR) members to provide the full spectrum of services (MILPDS, DCAPES,[2] etc.) to AC members.

At the outset, we note that Air Force Instruction (AFI) 36-3802, *Personnel Readiness Operations*, 23 Feb 09, currently states that installation personnel readiness (IPR) offices "can not issue CED orders on personnel the servicing MPF does not have administrative control over (e.g., active duty IPRs cannot issue CED orders on ARC personnel)."[3] This restriction, however, is not contained in federal statutes or DOD guidance. It is purely a matter of Air Force policy. We also note that during past discussions, some stakeholders have been concerned about providing unlimited authority in DCAPES to RC members. Some feared that mistakes might be made or orders for AC members might be cut to fill RC deployment requirements. These concerns, again, do not raise legal considerations, but rather matters of technology and policy. We express no opinion regarding the advisability of having RC members provide full FSS services, we only opine on the legal authorities and restrictions to doing so.

We also note, however, that requests for CED orders and some other FSS functions are made and fulfilled electronically, such that the customer does not observe the FSS member performing the service. For these services, it would be possible to provide an AC customer "One-Stop-Shopping" by accepting requests for CED orders in any FSS and then passing that request to an FSS of the customer's component. The like-component FSS could then prepare and return the orders (or other document) to the servicing FSS for delivery to the customer. The customer would not know – and likely would not care – who actually prepared the documents. Coordination between the FSS offices should not notably slow the process, and the cost of modifying DCAPES and ensuring cross-component services remain within current legal limits would be avoided entirely.

Assuming such coordinated services are either infeasible or unpalatable, the following analysis outlines the various legal limitations, as they exist today, which apply to cross-component FSS services and provides proposed legislative changes to lift some of those limitations.

Legal Concepts – Three Component Construct

There are several legal limitations to a combined, cohesive, "total force" approach to Air Force operations. Many of them have very deep roots in the United States' republican form of government and its tri-partite governing structure (legislative, executive, and judicial branches). This section briefly reviews that history.

The origins of the Air Force lie in the Army Air Corps. The Army was founded in June 1775, when the Continental Congress created the first Continental Army. The National Guard predates both,

[2] Deliberate and Crisis Action Planning and Execution System (DCAPES).
[3] Paragraph 7.2.1.

tracing its history back to militia regiments formed by the Massachusetts Bay Colony in 1636.[4]

After the Revolutionary War, the Continental Congress disbanded the Continental Army out of a distrust of large, standing armies that could be used at will by a tyrannical leader and a preference for a small standing army, supplemented by citizen-soldiers in times of a national emergency.[5]

The Founding Fathers codified this perspective in the Constitution by dividing power among the executive, legislative, and judicial branches; designating the President as the commander-in-chief;[6] and granting Congress the power to control the military through its authority to tax, spend, provide for the common defense, raise and support armies, and declare war.[7]

In addition to these intra-federal limitations, the Founding Fathers also limited federal power by guaranteeing the States a right to a republican form of government.[8] They viewed this as the most workable way to prevent federal tyranny and over-reaching while avoiding the unwieldy, disorganized, chaos that can result from a pure democracy. In 1791, the States' powers were expanded by the Second Amendment which granted all people the right to keep and bear arms, because "a well-regulated militia [is] necessary to the security of a free State[.]"[9] Congress's power "to provide for organizing, arming and disciplining the militia" and to govern them was limited to only those militia members who were called into federal service.[10]

Through these constitutional provisions, therefore, the Founding Fathers intentionally designed the United States' governing and military structure to allow cooperative Federalism while also preventing tyranny through institutionalized friction points: the executive branch's military might is limited by Congress' legal and financial powers and the federal armed forces are counter-balanced by the States' militia – which can only be federally controlled when called into federal service.

While the early-United States relied solely upon State militias for its ground defense,[11] continuing conflict with Native Americans led the nation to realize it needed a trained standing army. The Legion of the United States was established in 1791 and it eventually evolved into the US Army.[12]

Meanwhile, between 1881 and 1892 most states changed the name of their organized militia to the National Guard.[13] In 1903, National Guard became formally recognized as the nation's organized militia and a federally-funded RC. These laws were later moved to Titles 10 and 32 of the US Code.[14]

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[4] DoD 1215.15-H, *Reserve Components of the Armed Forces*, Jun 96, at 6, accessed at http://www.dtic.mil/dtic/tr/fulltext/u2/a315871.pdf on 11 Jul 13 (hereinafter DOD 1215.15H).
[5] Id.; US Army Center of Military History, "The Formative Years, 1783-1812" (an extract from *American Military History, Volume I*), available at http://www.history.army.mil/books/AMH-V1/ch05.htm , accessed on 11 Jul 13 (hereinafter "The Formative Years").
[6] US Constitution, Article 2, Section2.
[7] US Constitution, Article 1, Section 8; "The Formative Years" at 112.
[8] US Constitution, Article IV, Section 4.
[9] US Constitution, Second Amendment.
[10] US Constitution, Article 1, Section 8.
[11] "The Formative Years" at 107-109.
[12] "The Formative Years" at 119.
[13] There are two branches of militia: the organized militia (men and women in the National Guard) and the unorganized militia, which includes all able-bodied males between the ages of 17 and 45. 10 USC § 311.
[14] The Militia Act of 1903. In 1956 the US Code was reorganized, moving the laws governing military departments to Title 10 and the National Guard provisions to Title 32. Act of August 10, 1956, 70A Stat. 676

After German U-boats sunk the Lusitania on 7 May 1915 and Pancho Villa crossed the New Mexican border in March 1916, concerns about American preparedness and ability to fight in World War I gained momentum.[15] Consequently, Congress passed the National Security Act of 1916 which quadrupled the National Guard; directed the creation of an Officers Reserve Corps, an Enlisted Reserve Corps and the nation's Air Reserve Program; and consolidated and formalized the Reserve Officers' Training Corps in colleges and universities.[16] These Reserve Corps were clearly federal reserve, not militia, and the official Reserve Corps was established in March 1917.[17] About 11,300 of the Army Air Service pilots who served in World War I were reserve officers.[18]

In 1933, the Army force structure formally combined into three components: the active, reserve, and National Guard forces, all of which included aviation.[19] In 1947, the Air Force became a separate service, with an Air National Guard and Air Reserve component, mirroring the Army's three component structure.[20]

But the precarious balance between the components continued. Some viewed "the Air Reserve as a stew-pot, composed of leftovers not included in either the Regulars or Air National Guard."[21] The National Guard was designated as the Army's first line reserve component while the reserve mission was merely to bring the Active and National Guard to a mobilized strength.[22] Members of the Organized Reserve would be mobilized as individuals while the National Guard would be mobilized by units.[23] Subsequently, the War Department, the Army Air Forces, and after September 1947, the Air Force, failed to develop set war and mobilization plans. Legislation in the 1950s and early 1960s slowly changed the role of the Organized Reserves to include providing trained units in addition to individual members.[24]

Following the experience of fighting an unpopular war in Vietnam, the 1973 Total Force Policy intertwined the RC and AC forces in an effort to limit the President's ability to conduct extended

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[15] Airpower against Mexico and Pancho Villa did not include reserve volunteers as Congress had not enacted legislation or called for volunteers. Juliette Hennessy, *The United States Army Air Arm: April 1861 to April 1917*, U.S. Air Force Historical Study No. 98, Office of Air Force History, USAF: Washington DC, 1985, available at http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GetTRDoc.pdf&AD=ADA439945, accessed on 15 Jul 13.

[16] Hennessey.

[17] Gerald T. Cantwell, *Citizen Airman: A History of the Air Force Reserve, 1946-1994*, (Air Force History and Museums Program: Washington DC) 1997, p. 5; Pub.L. 64–85, 39 Stat. 166, Section 9, 3 Jun16, available at http://books.google.com/books?id=CGj_5WJx_ToC&printsec=titlepage#v=snippet&q=reserve%20&f=false at 37-40, accessed on 11 Jul 13. See also Center for Army Lessons Learned, *National Defense Act of 1916*, available at http://usacac.army.mil/cac2/call/thesaurus/toc.asp?id=33493, accessed on 11 Jul 13; US Army Cadet Command, *History of Army ROTC*, available at http://www.cadetcommand.army.mil/history.aspx, accessed on 11 Jul 13.

[18] "Final Report of the Chief of Air Service, American Expeditionary Forces" in *United States Army in the World War 1917-1919*.

[19] In 1933, the National Guard formally became a component of the Army. 48 Stat. 149, 155.

[20] Pub.L. 80–253, *National Security Act of 1947*, 61 Stat 495, 502, 26 Jul 47, accessed at http://www.webcitation.org/5Xi9eEYG9 on 11 Jul 13.

[21] Major General Earle E Partridge, cited in Cantwell, p. 23.

[22] Cantwell, p. 33.

[23] Annual Report of the Chief of Air Corp, WDAR, 1934, p. 29.

[24] Library of Congress, *Historical Attempts to Reorganize the Reserve Components*, Oct 07, at 2-3, 8, and 14, accessed at http://www.loc.gov/rr/frd/pdf-files/CNGR_Reorganization-Reserve-Components.pdf on 11 Jul 13 (hereinafter *Historical Attempts to Reorganize*).

operations without calling up the RC.[25] This policy echoed the original intent of the Founding Fathers to have a small standing army, supplemented by citizen-soldiers in times of national emergency.[26]

Since World War II, RC forces have routinely been underfunded and ill-equipped by the executive branch.[27] Consequently, Congress passed laws to directly fund, equip, and designate leadership of RC forces separately from the AC. Thus, while the laws described below may seem obstreperous and inefficient, and they might appear to impinge upon a collective effort to move the RC from a strategic to an operational reserve without calling those forces to active duty – this result is not an accident. It is an intentional exercise of congressional powers to restrict the executive branch and to protect the representative form of government. These laws will not be easily changed because they are the product of a 200-year-old (and still raging) power-struggle between the legislative and executive branches and the federal and state governments.[28]

Potential legal limitations to TFI FSS efforts include: financial requirements, duty status limitations, and end strength caps.

Legal Concepts – Financial Requirements

The Purpose Statute requires federal employees and military members to expend funds only for the purposes established by Congress – or reasonably related and necessary to carry out those purposes.[29] Violations of the Purpose Statute can result in violations of a criminal statute called the Antideficiency Act (ADA), which prohibits federal employees and military members from authorizing or expending funds in excess of the amounts appropriated by Congress or permitted by agency regulations.[30] Generally, this means RC personnel cannot perform missions assigned to the AC for which the AC has received congressional appropriations (i.e. money or personnel).

In situations where the AC needs to obtain services beyond their capabilities, there are statutory authorities which can be availed to meet these needs. For example, under the Economy Act, a federal agency, or military component, may obtain goods and services from an outside source if it reimburses the other agency, or military component, for those goods and services according to a signed agreement or order.[31]

Legal Concepts – Reserve Component Duty Statuses

In addition to financial limitations, Congress has established a variety of duty statuses for RC members and listed the types of work members can perform in those statuses. Traditional reserve (TR) and drill-status guardsmen (DSG) are required to serve in military status at least one weekend a month and two weeks during each year.[32] For purposes of this memo, full-time support (FTS) guard and reserve members include Active Guard and Reserve (AGR) (military FTS) or dual-status military

[25] Doubler, Michael and Renfroe, Vance. "The National Guard and the Total Force Policy". *The Modern National Guard.* Tampa, Fl.: Faircount LLC, 2003. 42-47, available at http://www.minutemaninstitute.org/publications/National%20Guard%20and%20Total%20Force.pdf, accessed on 11 Jul 13.
[26] DoD 1215.15-H at 6.
[27] DoD 1215.15-H at 7; *Historical Attempts* at 2-3, 8, and 14.
[28] See also *Historical Attempts.*
[29] 13 USC § 1301.
[30] 32 USC § 1341, 1517.
[31] 31 USC § 1535
[32] 10 USC § 12301; 32 USC § 502.

technicians (civilian FTS who are required by law to also be members of a guard or reserve unit).[33] The scope of duties that FTS members can be assigned is limited by the financial matters outlined above and by express duty limitations established in a variety of statutes. For example, Title 10 and Title 32 AGRs' primary duties are organizing, administering, recruiting, instructing or training (OARIT) the RC.[34] Technicians' primary duties include organizing, administering, instructing or training (OAIT) the RC, and maintaining or repairing supplies and equipment (including aircraft) of the armed forces.[35]

In addition to these primary duties, FTS members can support various operations or missions specified in statutes, as long as those additional duties "do not interfere" with the FTS members' primary duties of OARIT/OAIT for the RC and maintenance/repair of armed forces aircraft and equipment.[36] The list of permissible additional duties under Title 32 is much shorter than the list under Title 10.[37] The extent to which these additional duties can be performed is not clear because the phrase "do not interfere" is not defined in the statutes.

In addition to DSG and FTS duty status, ANG members may also be serving in FTNGD status which might include training or other duty (not inactive duty), annual tour (AT), operational support funded by the RC for any mission assigned to the unit,[38] and homeland defense activities authorized by the Secretary of Defense.[39] The duty performed by these ANG members is restricted by the statutes under which they are serving, as discussed below.

Finally, the law allows an RC member who is on active duty other than for training under Title 10 to be detailed or assigned to any duty authorized by law for members of the regular component.[40] This statute applies to ANG and AFR members who are in ADOS funded by the AC.[41] We caution the reader not to interpret this statute (10 USC § 12314) too broadly, because it cannot be used to relieve a Title 10 AGR from the legal requirement to perform OARIT for the RC as a primary duty.

Legal Concepts – End Strength Caps

Each year, Congress establishes the maximum numbers of people that can be in the Air Force, AFR and ANG.[42] Congress allows the AC to exceed these numbers by two to ten percent and allows certain RC members who are performing duties for the AC in Title 10 active duty status to do so without being counted against AC end strength for up to 1095 days in any 1460 day period (i.e. three out of four consecutive years).[43] If the AC commits through an original set of orders to bring an RC member on active duty status for more than 1095 days, then that person counts toward AC end strength

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[33] AFI 36-2132, *Full-Time Support (FTS) to the Air Force Reserve*, 23 Mar 12, para 1.1.1. The Air Force also employs a small number of non-dual status technicians who are not required to be members of a guard or reserve unit. 10 USC § 10217. Because these non-dual-status technicians are also bound by 10 USC § 10216 (see 10 USC §10217(b)(1)), the distinction is irrelevant here and non-dual-status technicians will not be addressed separately in this memo.

[34] 10 USC §§ 101(d)(6)(A) and 12310(a); 32 USC § 328.

[35] 10 USC § 10216(a); 32 USC § 709(a).

[36] 10 USC §§ 12310(b), 10216; 32 USC §§ 328, 709.

[37] *Compare* 10 USC §§ 10216(a) and 12310(b) *with* 32 USC §§ 328(b), 502(f)(2), and 709(a).

[38] 32 USC § 502(f)(2)(A)

[39] 32 USC § 901.

[40] 10 USC § 12314.

[41] AFI 36-2254 volume 1, *Reserve Personnel Participation*, 26 May 10 ("AFI 36-2254V1"), Chapter 4 and paras.6.3.3.1.

[42] 10 USC §§ 115(a-c) and 523.

[43] 10 USC § 115(b)(2), (f), and (g).

for the total number of days covered by the orders. If, however, the 1096th day is reached through a series of orders, collected over time, then that person counts toward AC end strength only for the number of days on active duty that exceed 1095.[44]

Congress also sets the total number of RC members who may perform duty in AGR and technician statuses, each year.[45]

Applying Statutes to the Performance of FSS Duties by Members of the RC for AC

Applying these legal concepts to A1's 3-to-1 project outlined above, we find that RC members can legally provide FSS services to AC personnel in all duty statuses, to a varying degree.

TR and DSG: TR and DSG are required to serve in a federal status a minimum of one weekend a month and two AT weeks of the year.[46] Because these RC unit members do not work during the typical AC work week (Monday-Friday, 0730-1630), they could not provide full-time support to the AC. Nevertheless, if an AC member required FSS services during a drill weekend or an RC member's AT and that RC member could perform those services as part of his/her training for his/her federal mission, then the incidental benefit received by the AC member would not violate the Purpose Statute or ADA. In other words, if the RC member was going to perform the services as part of his/her training anyway, the fact that an AC member incidentally benefited would be inconsequential.

Unfortunately, there is no bright line rule to determine when the benefits to the AC exceed the "incidental" threshold and are no longer justified by the training provided to RC personnel. In evaluating these cases, we generally consider the following factors:

a. **Whether performance of the federal operational mission is consistent with the unit's formalized training program.** If the services the FSS member will be asked to perform are the same as the services the FSS member will be performing when in active duty status for a federal mission, then there is a demonstable training benefit. If, however, the RC unit does not use DCAPES, for example, or would not perform the specifically requested FSS service when activated, then there is no training benefit from the FSS services provided and the performance of such a service by RC personnel for AC personnel would not be justified as an incidental benefit.

b. **Whether the federal mission can be performed without the RC unit.** If the RC unit stopped providing FSS services, would the AC forces still be able to accomplish their federal mission? If there are only a few AC forces that would need assistance and the AC could service them elsewhere without much difficulty, then this supports the argument that the purpose of the task was merely for training. If the level of effort is more onerous than that, or no one in the AC can assist if the RC forces no longer provide assistance, then it is fairly clear the primary purpose of the task was to accomplish the federal mission, not to simply train the RC.[47]

[44] Id.
[45] 10 USC § 115(a) and (d).
[46] 10 USC § 10147; 32 USC § 502(a).
[47] This factor considers the volume of demand in a non-mobilized state. It would be acceptable for the RC unit to be mobilized to meet peak demand.

c. **Whether the use of FTS or FTNGD RC members is disproportionate.** If the RC unit needs to place additional members on FTS or FTNGD status in order to accomplish the AC FSS services, then it is pretty clear those additional FTS and FTNGD members are not being utilized for training or their statutory OARIT purpose. Those additional FTS and FTNGD members are being brought into or maintained in a full-time status, to service AC clients – which is a federal, AC, mission and should be funded through AC appropriations.

It helps to consider an example of incidental benefit: A RC Red Horse team needs to conduct training on drilling a fresh water well in a remote or austere location (one of their specific Mission Essential Task Listing (METL) responsibilities). If that Red Horse team deploys to Haiti, or another non-developed or minimally-developed nation to conduct training in an austere environment, it does not matter that at the end of their required training, the Haitian people incidentally benefitted by the well left behind by the performance of the Red Horse team's training. The purpose of this training was for the Red Horse team to gain the experience of operating in an austere environment—i.e., to train to a METL. It is perfectly legal for the Red Horse team to perform this labor. Of course, the materials necessary to construct the well would require an independent funding source (e.g., World Bank, United Nations, or foreign aide could be used to procure the necessary well materials).

The same is true here. If RC FSS members will need to provide DCAPES and other FSS services to AC personnel when they are performing their Title 10 active duty mission and the RC FSS members need to train to perform those duties, then it does not matter that an AC member might incidentally benefit from that training by having their actual DCAPES orders cut by an RC member. At some point, of course, this theory can be stretched beyond credulity where the RC members are no longer receiving a training benefit and the services are simply being provided to support AC forces. At that point, other legal alternatives need to exist which support the performance of these duties.

A second legal theory available to support the use of TR or DSG members to perform FSS duties for AC members is called "the de minimis doctrine." Using this legal theory, TR or DSG members may also provide FSS services to AC members in such a small amount that the effort required to research, substantiate, and reconcile records to account for those services would grossly outweigh any potential benefit to the taxpayer. The function of "the de minimis doctrine" is "to place 'outside the scope of legal relief the sorts of intangible injuries, normally small and invariably difficult to measure, that must be accepted as the price of living in society.'"[48] This legal theory would allow the RC to occasionally provide FSS services to an AC member in such a small amount that it would not be worth the effort required to pursue reimbursement/accountability. Similarly, if an RC member on duty had an hour or two of excess time, such that assisting an AC member would not cause any incremental cost increase to the RC, then it is likely outside the scope of legal relief. This theory, though, would not allow RC members to perform FSS services to AC members on a regular basis or when it amounted to a more substantial workload.

FTS and FTNGD: FTS RC members (including AGRs and technicians in Title 10 and Title 32 duty statuses) and FTNGD are in federal duty status during the typical AC work week and like TR and DSG, may provide incidental and de minimis FSS services to AC members as described above.

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[48] James Nemerofsky, "What is a 'Trifle' Anyway?" Gonzaga L. Rev., 2001/02, 315-341, 323 quoting 27A AM. JUR. 2D Equity § 118, at 599 (1996) (citations omitted). Available at http://blogs.gonzaga.edu/gulawreview/files/2011/02/Nemerofsky.pdf, accessed on 11 Jun 13.

In addition, AGRs and technicians ***in Title 10 status*** (which, at the unit level will only be AFR members)[49] may provide services to the AC on a more regular basis if (1) the mission is assigned to the RC (for technicians the assignment must be directly to their unit); to a composite AC/RC Air Force unit; or a joint unit; and, (2) the services provided to the AC do not interfere with the AFR members' primary duties of performing OARIT for the RC.[50] For purposes of this memo, therefore, if providing FSS services to AC squadron "X" is assigned as a mission in whole or in part to an RC member's unit, Title 10 AGRs and technicians assigned to that unit may provide services to squadron "X" members to the extent those services do not interfere with the AGRs' and technicians' primary OARIT/OAIT duties.[51]

Title 32 (ANG) AGRs and technicians may also provide FSS services to the AC as an additional duty that "does not interfere" with their primary duties if the mission is undertaken by their unit at the request of the President or Secretary of Defense.[52] The statutes that govern ANG FTS members do not include the ability to perform missions assigned to the ANG member's unit by a lower level of authority, to the RC generally, to a unit comprised of elements from more than one RC, or to a joint forces unit; these options are reserved for Title 10 status.[53]

You have asked that we explain why this office has recently found a proposal for ANG technicians (in Title 32 status) to perform maintenance on AC aircraft to be legally sufficient and why the analysis in that opinion does not apply to FSS services. We recently concluded that a proposal to use ANG technicians to maintain and repair ANG aircraft in support of an AC mission was legally sufficient because: (a) the law explicitly allows ANG technicians to maintain and repair supplies and equipment issued to the National Guard **or the armed forces** as a primary duty[54] and (b) the ANG would be reimbursed by the AC for all incremental costs associated with the increased personnel and use of the aircraft caused by the AC mission, in compliance with the Economy Act.[55] In the case of staffing an FSS, the statute does not expressly allow Title 32 FTS personnel to perform FSS services benefitting the AC.

Both Title 10 and Title 32 FTS and FTNGD personnel in a TFI unit (whether formally or informally associated) may also serve AC customers without limitation, as long as the AC/RC mix within the FSS matches or closely resembles the AC/RC mix of the FSS customers. In other words, if the FSS is 70% AC/30% RC and the FSS customers are 70% AC/30% RC, then it does not matter which FSS member serves which client. The benefits to each component are proportionate.

ADOS: In ADOS status funded by the AC, there are no limits to the amount or kind of support

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[49] ANG AGRs at the unit level are in Title 32 duty status. See footnote 1 above.

[50] 10 USC §§ 10216(a)(3)(A), 12310(b)(1). Title 10 AGRs may also advise the Secretary of Defense, military secretaries, the Joint Chiefs of Staff and combatant commanders regarding RC matters. 10 USC §§ 10216(a), 12301(b).

[51] If providing FSS services to squadron "X" is assigned to the RC, Title 10 AGRs may provide those services regardless of the unit to which the mission was assigned as long as the services do not interfere with the AGR's primary OARIT duties. 10 USC § 12310(b)(1). Or, if the mission is assigned to a unit composed of elements from more than one component, one or more RC units, or a joint forces unit, then Title 10 AGRs and technicians assigned to that unit may provide FSS services to AC members as long as doing so does not interfere with their primary OARIT/OAIT and/or maintenance duties. 10 USC §§ 10216(a)(3)(B)(i), 12310(b)(2)(A).

[52] 32 USC §§ 502(f)(2)(A) and 709(a)(3)(A) & (B).

[53] Compare 32 USC §§ 502(f)(2) and 709(a) with 10 USC §§ 12310(b) and 10216(a)(3).

[54] 10 USC §§ 101(13)(defining supplies), 709(a)(2).

[55] DoD 7000.14-R, *Financial Management Regulation*, vol 11A, Ch1, § 010203 provides guidance on reimbursable labor costs for the Economy Act orders.

RC personnel provide to AC members. As stated above, an RC member in ADOS status can be assigned any duty that could lawfully be assigned to an AC member.[56] It is important to note, however, that if a particular RC member is on ADOS status for more than 1095 days in any 1460-day period (or more than three out of four years), then s/he is counted against AC end strength, as discussed in the Legal Concepts – End Strength Caps section above.

Legislative Proposals

You have asked us to identify elements of the law that would have to change to lift the limitations to RC members' duties outlined above. The first limitations are found in statutes (such as 32 USC § 102) and in the Constitution which establish the proper use of ANG personnel and resources when not in federal status. Constitutional amendments are rare and very difficult to achieve. Moreover, political will is currently too fractured to obtain a simple majority on most votes, let alone the two-thirds majority required for a constitutional amendment.[57] Added to that, the National Guard has significant political power in Congress and recently acquired a seat on the Joint Chiefs of Staff.[58] The National Guard is unlikely to cede that power to the Department of the Army and Department of the Air Force by allowing Guard troops to be used for federal missions without compensation or limitation.

A second set of limitations are financial: namely the Purpose Statute, ADA, and Economy Act. Congress is unlikely to change these statutes as they do not want executive departments or agencies to obligate taxpayer funds without regard to congressional limitations or for purposes other than those specifically approved by Congress. Doing so would significantly undermine Congress' "Power of the Purse." Furthermore, Congress will argue the components can purchase goods and services from each other as authorized by the Economy Act, so financial restrictions are already sufficiently flexible to accommodate the desire to use the various components in various roles.

The FSS could avoid Purpose Statute and ADA violations, however, by seeking amendments to statutes addressing the third set of limitations: RC duty statuses. For example, current laws allow Title 32 technicians to perform maintenance on AC aircraft and equipment as a primary duty, so there would be no duty status or Purpose Statute /ADA violation if a technician were to perform this work.

Similarly, if Congress specified FSS services to the AC as a permissible primary duty of AGRs and technicians,[59] there would be no Purpose Statute, ADA, or duty status violation if an RC member were to perform this work. Alternatively, the same result could be accomplished if laws requiring AGRs and technicians to perform only OARIT/OAIT for only "the reserve components" were amended to remove the phrase "the reserve components."[60] Then, AGRs and technicians could organize, administer, (recruit), instruct, and train all forces without limitation. This would be similar to the ability already permitted by Congress for technicians to maintain all armed forces equipment/supplies without regard to "ownership/possession."

These efforts, however, would likely meet with resistance. Statutes governing AGRs and technicians generally apply to both the Army and the Air Force. Any legislative proposals would

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[56] 10 USC § 12314.
[57] U.S. Constitution, Art. V.
[58] 10 USC § 10502(d).
[59] 10 USC §§ 10216(a), 12310(b); 32 USC §§ 328(b), 502(f)(2), 709(a).
[60] 10 USC § 12310(d) and 32 USC § 328(b).

either need to be coordinated with and approved by the Army, or drafted in such a manner that they would only apply to the Air Force.[61]

Additionally, these statutory duty limitations (non-interference with OARIT/OAIT) were created in FY07, when (after coordinating with the Army) the Air Force asked Congress to allow AGRs and technicians to train AC forces and to perform other missions assigned by the President, Secretary of Defense, or Secretary of the Air Force to the RC unit. Congress granted the Air Force's request, but limited RC forces' ability to perform these additional duties to a level that does not interfere with their primary OARIT/OAIT duties to the RC.[62] Further attempts to revise this statutory language will be perceived as further attempts to diminish congressional control of the armed forces and increase the potential for federal over-reaching/abuse of the state militia.

That being said, the political climate has changed significantly over the past few years. In 2012, Congress perceived that the AC wanted to marginalize and remove missions, aircraft, and personnel from the RC, particularly the ANG. Consequently, Congress formed the National Commission on the Structure of the Air Force (the Commission) and charged it with determining how the AC and RC should be configured, organized, and structured.

If the AC and RC were to jointly approach Congress and the Commission in the near term with a proposal to move RC-compatible mission sets – namely those that are enduring, predictable, repeatable, and experience-demanding – to the ANG (such as pilot training and potentially FSS services) in a way that respects congressional authority and States'/governors' rights, Congress and the Commission might be amenable to making these statutory amendments than they were in 2006.

Moreover, these changes would likely help stem the loss of highly trained and experienced AC airmen to the private sector. The AFR Recruiting Service reports that between 2005 and 2012, the number of non-prior service (NPS) recruits needed to meet recruiting goals nearly doubled, because AC members simply are not joining the RC at their previously high historic levels. They are quitting military service altogether.

Consequently, in 2012, more than 44 percent of AFR recruits had never served in any branch of the military before joining the reserves.[63] This means RC training costs will have to be significantly increased. If this trend is not corrected, the historically deep trough of experience in the RC may be in jeopardy. If Congress were to allow the Air Force to move enduring, predicable, repeatable, and experience-demanding mission sets to the RC, AC members who prefer a lower operational tempo and no more PCS moves, but who would still like to fly or otherwise participate in a fulfilling Air Force career, might be inspired to transfer to the RC rather than leave military service altogether.

To that end, a more conservative legislative proposal than those discussed above would be to allow Title 32 AGRs and technicians to perform duties in support of operations or missions assigned in

[61] See, for example, Section 345 of the Ike Skelton Fiscal Year 2011 National Defense Authorization Act (which now resides in the notes to 10 USC § 8062), which requires all three Air Force component leaders to sign a written agreement for all aircraft transfers from the RC to the AC. No other service is required to sign agreements before transferring equipment between components.

[62] John Warner National Defense Authorization Act for Fiscal Year 2007, P.L. 109-364, Section 525, "Authority for Active Guard and Reserve Duties to include Support of Operational Missions Assigned to the Reserve Components and Instruction and Training of Active Duty Personnel," 17 Oct 06.

[63] Unofficial reports from the ANG report a similar trend with NPS now constituting 54 percent of ANG recruits.

whole or in part to the member's unit or the reserve components – similar to the language that applies to Title 10 technicians and AGRs, respectively.[64] This language, though, was considered and rejected by Congress in 2006 as being overly-broad. Even with recent political changes, therefore, this language may have difficulty garnering enough support.

An even-more-narrow approach would be to identify FSS services specifically as an additional duty for FTS members in Title 32 status. This would allow Title 32 RC members to provide FSS service to AC personnel on more than a de minimis or incidental benefit basis, but only to the point of not interfering with current congressionally-mandated OARIT/OAIT primary duties. Draft legislation to accomplish this more narrow approach was previously provided to AF/A8 and is attached to this memorandum.

Finally, a fourth set of limitations to TFI FSS services is imposed by the congressionally-mandated active duty end strength caps. These caps limit the number of RC members that can be placed in AGR and technician duty status and the number of RC members that can be brought to active duty status to perform AC missions. Lifting the AGR/technician end strength caps, however, would not provide any relief in this situation because even if more AGRs and technicians could provide support, the financial and duty status limitations described above would still apply.

Lifting the end strength limit for the number of RC forces that can be brought on Title 10 man-days in active duty status would provide relief. The AC, however, would also have to reapportion its man-days to support such an endeavor or ask Congress to increase its man-day budget. Given the historical desire of Congress to control military action and the current austere fiscal environment, it may prove difficult to gain support from Congress for either request.

Based on the above analysis and legislative options, if you anticipate that FSS support to AC members will be needed on more than a de minimis, incidental, or proportionate basis, we recommend providing man-days to RC forces to provide periodic support and/or seeking legislative change to allow FSS services to be provided as a primary duty of AGRs and technicians in both Title 10 and Title 32 status.

If you have any questions, please do not hesitate to contact Lt Col Maren L. Calvert at (703) 614-4078.

Conrad Von Wald

CONRAD VON WALD
Director, Administrative Law
Office of The Judge Advocate General

Attachment:
Draft legislative language

[64] 10 USC §§ 10216(a)(3)(A), 12310(b)(1).

SEC.___ . REQUIRED DRILLS AND FIELD EXERCISES

Section 502 of title 32, United States Code, is amended by relettering the existing subparagraph (f) (2) (B) to (C) and adding a new subparagraph (B) "Support for the processing of deployments assigned in whole or part to the active associate unit of a National Guard unit."

Section-by-Section Analysis

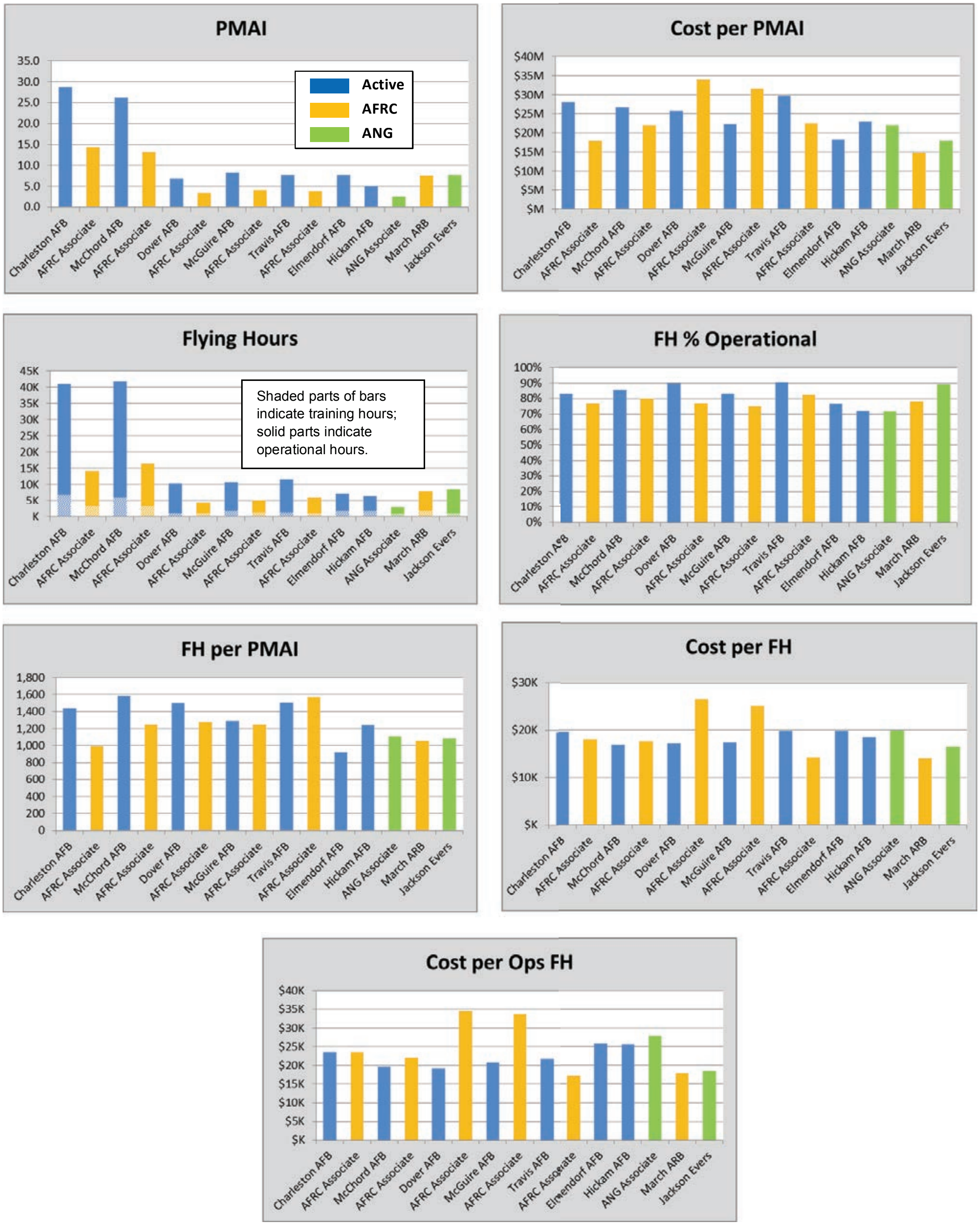
This proposal would allow the Air National Guard partner unit in an active association to process deployment orders for deployments undertaken by the Air National Guard and Active component associated units together as well as those undertaken by the Active component alone.

Appendix C. C-17 Unit Cost Comparisons

The figures in this appendix provide unit cost comparisons similar to those produced for F-16, C-130, and KC-135 units in Robbert (2012). The analyses used data spanning FY2006–2010. The cost and flying hour data were derived primarily from the Air Force Total Ownership Cost system. See Robbert (2012) for a description of the methodology.

These figures differ slightly from similar figures shown in Robbert (2012) in their treatment of host and associate units. In Robbert (2012), all aircraft were shown as being owned by the host unit. Where costs per aircraft or flying hours per aircraft were shown, the denominator for both host and associate units was the count of aircraft owned by the host unit. In these figures, we allocated the host unit's aircraft to the host and associate units based on their shares of the total crew ratio. In C-17 units, crew ratios are 3.0 for host units and 1.5 for associate units. Thus, associate units provide one-third of the crews in a host/associate pairing. Accordingly, we allocated one-third of the host unit's aircraft to the associate units. This allowed us to compare aircraft ownership costs of force structure in the three organizational constructs observed in this mission—equipped AC, equipped RC, and classic associate units.

Figure C.1. C-17 Cost Comparisons



Appendix D. Absorption and Sustainment Processes

This appendix contains a general description of the processes by which new pilots are initially absorbed into operational units. It also provides the mathematical relationships between absorption and sustainment flows, the health of operational units, and overall pilot inventories. Additionally, it provides analyses of the benefits of associate units in providing fighter pilot absorption capacity that approximately meets sustainment needs.

Pre-Absorption Training

New accessions normally begin with an intensive training program that can be a commissioning program for officers or Basic Military Training for enlisted personnel. These programs may vary in length, and individuals may undergo extensive screening and testing programs before and after entering the training. They still share several features:

1. These programs have positive attrition rates, and new accessions gain status as official Air Force members only after the successful completion of an initial commissioning or basic training program.
2. Performance and test scores during this training often determine which of various career tracks may be offered or become available to the trainees.
3. The initial accession training program will be followed by one or more formal training courses, each of which also has positive attrition rates and shares the performance-based tracking properties found in accession programs.

Absorption into Operational Units

The pre-absorption training phase ends and the absorption phase begins once all post-accession formal training is completed and individuals report, typically with a newly awarded entry-level AFSC, to their first operational Air Force assignment in a unit whose principal mission is (normally) not formal training. As they begin the absorption process, however, most individuals are placed in a new training status, such as on-the-job-training (OJT) for enlisted specialties or mission qualification training (MQT) for aircrews. Positive attrition rates, however, are no longer expected for OJT or MQT trainees.

New fighter pilots, for example, will have completed over a year-and-a-half of post-commissioning formal training that begins with a year-long undergraduate flying training (UFT) course and culminates with a six-month fighter flying training unit (FTU) basic course (B-Course) that lasts about six months. Sandwiched between are additional introduction to fighter fundamentals (IFF) and survival courses, so the total pre-absorption pipeline typically consumes at least three years of commissioned service, depending on the duration and spacing of the breaks in training that occur between the formal training courses.

Fighter Pilot Absorption

Fighter pilot absorption begins as the pilots report to their initial operational assignments and continues until they become *experienced* fighter pilots, which requires 500 flying hours in their primary mission aircraft (or the equivalent) in accordance with formal Air Force definitions.[43] Recent changes permit up to 100 hours of this time to be accumulated in appropriate high-fidelity simulators that are currently not available at many operational units, especially those in the RC. The absorption step is essential, because fighter pilots must become experienced before they can be reassigned anywhere other than as aircrew position indicator – aircraft commanders, pilots, and co-pilots (API-1) pilots in operational units. Historically, this process has taken two to three years when the process is flowing smoothly for fighter units, which has not always been the case.

Because the absorption process turns brand new pilots into experienced ones, a unit's absorption capacity is defined as the number of pilots that that it can turn into experienced pilots each year. Over-absorption results in an insufficient proportion of experienced pilots in a unit, limiting the capacity of the unit to supervise and train the inexperienced pilots and extending the time required to reach the experienced level. Such efforts result in *stressed* and *broken* units (Taylor et al., 2002; Taylor, Bigelow, and Ausink, 2009). The Air Force has determined that, for operational fighter squadrons, at least 55 percent of the line pilots must be experienced.[44] Similar issues have occurred in other career fields, where the Air Force, for example, has created maintenance units that are manned below 90 percent overall, but are 120 percent manned with apprentice (3-level) maintenance personnel, in attempting to compensate for inventory shortfalls.[45]

Sustainability

Sustainability measures a system's ability to sustain inventories that are adequate to meet system requirements. The first rule of steady-state sustainability, then, is that production rates should not exceed absorption capacities. For fighter pilots, this means that the number of graduates from fighter flying training units each year should never exceed the number of pilots that the operational fighter units can turn into experienced pilots in the same year.

A steady-state sustainable inventory is then equal to the annual production rate multiplied by the *residence time*, which is the expected time that inventory members will reside (or remain) in

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[43] The definition is contained in each of the fighter Volume 1s (e.g., AFI 11-2F-16, Volume 1). Pilots with at least 1,000 total Air Force flying hours meet the experienced criterion with 300 hours in their primary mission aircraft, while pilots who were previously absorbed in another fighter (and met its "experienced" criterion) become experienced with 100 hours in their new primary mission aircraft. Additionally, in some cases and to some degree, simulator hours can substitute for actual flying hours.

[44] See AFI 11-412. When units are 100 percent manned, this criterion ensures that adequate numbers of experienced pilots are available to provide required in-flight supervision as flight leads and instructor pilots, without requiring them to fly significantly more sorties than they individually require according to RAP minimum requirements. In the current constrained flying-hour environment, every extra sortie flown by an experienced pilot becomes a sortie not flown by inexperienced pilots, slowing their aging rate and limiting absorption capacity.

[45] Here the absorption process turns apprentice (3-level) maintenance personnel into journeymen (5-levels).

that inventory. A steady-state absorption model developed by RAND analysts uses the following input parameters, derived from Air Force experience from FY2001 through FY2011:

- Bonus take rate (for AC-accessed pilots at end of 10-year ADSC) = 50 percent[46]
- Bonus takers = 18 years of rated AC service
- Bonus non-takers = 10 years of rated AC service
- RC affiliation rate for bonus non-takers = 80 percent
- Affiliating pilots = 10 years of RC rated service
- RC accessed pilots = 18 years rated RC service.

Eighteen years may seem unusual here, but several factors are perhaps worth emphasizing. First, inventories in these analyses include only officers in the grade of O-1 through O-5. O-6s and above are separately managed. Also, recall that fighter pilots will have two to three years of commissioned service before they enter the fighter pilot inventory, so those who have completed 18 years of rated service normally will have also completed more than 20 years of commissioned service and can exit the inventory either through retirement or through promotion to O-6.

We can calculate the expected value for the total force rated service (TFRS) for two types of pilots: RC-accessed pilots clearly have a TFRS of 18 years, and AC-accessed pilots will fly in the AC for 18 years with a probability of 0.5 if they take the bonus. Those that don't take the bonus will fly only 10 years in the AC, but if they affiliate, they will fly another 10 years in the RC, for a total of 20 years. We can use Bayes' Rule (Feller, 1957, p. 114) to obtain the joint probability of not taking and affiliating to be 0.5 x 0.8 = 0.4 and the joint probability of not taking and not affiliating to be 0.5 x 0.2 = 0.1. Thus, the TFRS for AC-accessed pilots is given by

$$\begin{aligned} \text{TFRS} &= 0.5 \times 18 + 0.4 \times 20 + 0.1 \times 10 \\ &= 9 + 8 + 1 \\ &= 18 \text{ years.} \end{aligned}$$

We can also calculate the expected value of the total active rated service (TARS) for AC-accessed pilots because, with probability 1.0, they will fly in the AC for 10 years and those who take the bonus with probability 0.5 will fly in the AC for another eight years:

$$\begin{aligned} \text{TARS} &= 1.0 \times 10 + 0.5 \times 8 \\ &= 10 + 4 \\ &= 14 \text{ years.} \end{aligned}$$

Other Pilot Absorption

Outside of the fighter community, where aircrews include both a pilot and a copilot, absorption is governed primarily by the rate at which copilots can acquire enough experience to upgrade to aircraft commander. In mobility and other communities with multi-seat aircraft, absorption capacities are generally greater than sustainment requirements. In many such units, inexperienced pilots are over-absorbed, without ill effect on unit operations, in order to make up

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[46] The bonus referred to here is the *aviation continuation pay* (ACP) bonus offered to pilots at the end of the ten-year active duty service commitment incurred upon completion of pilot training.

for total inventory shortfalls among fighter pilots. The purpose is to provide a total pilot inventory large enough to fill pilot staff positions. For staff positions requiring a fighter pilot, a mobility pilot is considered preferable to no pilot or a non-pilot.

Fighter Pilot Production Constraints and Steady-State Assumptions

If we know the expected residence time in a given inventory and the required number of pilots, we can solve the sustainable inventory formula for required production rates. The current requirement for the total force is about 5,150 fighter pilots, with 3,400 AC requirements and 1,750 RC requirements. This requirement is projected to grow to 5,400 over the next few years. Thus required near-term total force production should range from about 5,150/18 = ~285, to 5,400/18 = 300.

The Air Force, however, is currently in a state of transition due to budgetary pressures, and the current fighter pilot production capacity is only about 250. During a rated summit meeting held in September 2011, Air Force leadership agreed to cap fighter pilot production at 278 pilots per year, but the increase in capacity from 250 to 278 will not be funded prior to the FY2015 Program Objective Memorandum. Meanwhile, the leadership hopes that members of newly created career fields for RPA operators in the 18X career field and air liaison officers in the 13L career field, which can substitute for fighter pilots in some staff positions, can help to make up the shortfalls in total pilot inventories that result from this production cap. Recent force structure reductions have taken the fighter fleet down to about 1,100 primary mission aircraft, but it is hoped it will return to ~1,200 aircraft by FY2020.[47]

The pilot production cap of 278 new pilots per year yields a steady-state total force inventory of about 278 x 18 = 5,004 pilots, which is insufficient to meet needs. To avoid chasing rapidly changing parameter values and to present a reasonably straightforward, steady-state analysis, we will adopt a set of steady-state assumptions that seem to represent a reasonable future. For this analysis, we will use a total force requirement of 5,200 pilots (3,450 AC; 1,750 RC) for a fighter fleet of 1,200 primary mission aircraft, with 60 percent (720) assigned to AC units and 40 percent (480) of the airframes to RC units. This requires an annual production value for the total force of 5,200/18 = 289 pilots per year, but the AC requirement is 3,450 pilots with an expected TARS value of 14. Thus, the AC production value is 3,450/14 = 246.4 pilots per year, which is well under the production cap, so we will first examine what happens if we try to resolve the AC problem in isolation from the total force.[48]

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[47] The production limits resulted from closing fighter flying training unit squadrons to meet budgetary constraints. Information in this paragraph is from the Air Force Directorate of Operations Force Management (AF/A3O-A) and our own models.

[48] We will also assume that 14 percent (about one in seven) of fighter flying training unit graduates were previously assigned as first-assignment instructor pilots (FAIPs) and therefore have 1,000 flying hours as they arrive at their first operational assignment. This allows them to become experienced with only 300 hours in their primary mission aircraft, and they can be absorbed more quickly than their inexperienced colleagues.

Active Component Issues

The principal absorption constraints on AC units are the 55 percent experience minimum and the number of flying hours available to the units. Recent budget constraints have caused the Air Force to limit units to fly only the hours required to ensure that assigned pilots meet (but do not exceed) their minimum RAP training requirements. Our steady-state absorption model, with these constraints imposed, indicates that AC units can absorb about 0.269 new pilots per aircraft per year, so the 720 AC aircraft will absorb 0.269 x 720 = 193.4 pilots per year, which is 53.0 pilots short of the required production. The resulting inventory is 193.4 x 14 = 2,708 pilots, 742 short of the required 3,450.

The most direct methods to reconcile the resulting AC pilot shortfall are to fly possessed AC aircraft more or to use RC aircraft to absorb AC pilots. AC units would need to exceed RAP minimums by 33.9 percent in order to absorb 246.4 pilots per year, which represents a significant budget challenge. One way for the AC to use RC aircraft to absorb AC pilots is through active associations.

Active Associations

As previously discussed, active associations place AC pilots (and other AC personnel) into RC units. AFRC has finalized plans to do this for 24-aircraft fighter units, placing seven inexperienced AC pilots and two experienced AC pilots in each squadron. The ANG has primarily 18-PMAI units and, at the time of this writing, is searching for its preferred active association format. We will assume here that ANG units have the same number of inexperienced AC pilots per airframe as the AFRC squadrons plus two experienced AC pilots per squadron. This yields 18/24 x 7 = 5.25 inexperienced CMR AC pilots, on average, per 18-PMAI ANG squadron.

This configuration allows a total of 62.4 AC pilots per year to be absorbed in RC units, which can be added to the 193.4 AC pilots absorbed in AC units to exceed the 246.4 pilot production level required to sustain an inventory that matches AC requirements. Adding the AC pilots to RC units, however, generates requirements for 190 additional AC pilots to fill these new billets, so the increased production and absorption values do not quite generate the required inventory, leaving it some 59 pilots short. This issue can be resolved, however, by using corresponding classic associations to place experienced RC pilots in operational AC units to offset a portion of the additional AC pilots required. A contingent of four experienced RC pilots in each CONUS-based AC fighter unit would eliminate the AC pilot shortfall entirely. This action has only a marginal effect on AC unit absorption, because the RC pilots will have slightly lower minimum continuation training requirements than the AC pilots they are replacing.

A concept similar to this has been tried before. In January 2002, the Air Force Deputy Chief of Staff for Plans and Operations (AF/XO) implemented a Total Force Absorption Program (TFAP) (AFI 11-412, p. 51). The program placed inexperienced and limited experience aircrews in RC operational units with a goal of reducing AC overmanning and RC undermanning while optimizing absorption. Via a memorandum of agreement, ACC and AFRC replaced TFAP with a Fighter Associate Program (FAP) (AFI 11-412, p. 51). The FAP's goal was to improve the health of AC fighter units by distributing the workload associated with the experiencing of new pilots and to improve the experience levels in active duty units. The program consisted of embedding one experienced and two inexperienced AC pilots into AFRC F-16 and A-10 units for seasoning. A reciprocal arrangement existed where three experienced AFRC pilots were also embedded into a number of AC F-15, F-16 and A-10 units. Administrative control for each component's personnel remained with that component. Operational control generally was given to the host unit (Air Combat Command and Air Force Reserve Command, undated). The FAP achieved its goals and set the stage for full-up associate relationships that followed.

The times to experience, which actually measure the average time pilots spend in the absorption phase, remain at reasonable levels throughout these computations, ranging from 2.1 to 2.25 years. Thus the creation of active associations appears to be capable of resolving the AC fighter pilot shortfall, but what are the effects for RC units?

Reserve Component Unit Issues

RC unit manning typically includes a mix of two types: (1) prior-service personnel, who were initially absorbed into AC units, separated from the regular Air Force later, and affiliated with the ANG or AFR; and (2) RC-accessed personnel. As previously discussed, for fighter pilots, both of these groups have lengthy expected periods of residence in the RC: 10 years for prior-service, and 18 years for RC-accessed pilots. Historically, units could access about one pilot per year, on average, and affiliate fewer than two to fill units with a highly experienced inventory containing about half of each pilot type.[49] The RC units have historically relied on high experience levels to maintain proficiency levels for part-time pilots and meet RAP training requirements with fewer flying hours. Both of these factors are clearly affected by active associations, and our models consequently track the required flying hours and resulting experience levels.

The active association configuration discussed above still requires total force production and absorption totals to be 289 pilots per year, 33.2 of which must be RC-accessions absorbed into RC units. This means that these units' experience levels will drop to about 65 percent. This compares with a 55 percent experience level in the AC, so the RC is bearing a fairly large share of the absorption burden. A principal reason for this is the constraint on flying hours in AC units to allow assigned pilots to meet, but not exceed, RAP minimums.

A 10 percent overfly authorization for AC units would raise the overall experience level for AC units, which could readily be converted into an RC experience increase by moving some of the absorption burden back into the AC units. It would also provide AC supervisors and schedulers a welcome increase in flexibility in managing training and unit combat status.

We still have not addressed what can be done regarding the present fighter pilot production limits. For a steady-state solution, an annual production (and absorption) rate of 289 pilots is currently required. We can hope that the Air Force can find the funds required to increase current 250-pilot annual limit to its agreed upon 278-pilot constraint. If further production increases are not feasible at that point, the Air Force can elect to live with the resulting shortfall (which is the

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[49] One RC-accession per year, for example, yields a steady-state inventory of 18 pilots, and 1.8 prior-service affiliations per year also provide a steady-state inventory of 18. The total of 36 pilots is a typical O-5-and-below requirement for an 18-aircraft RC unit.

short-term plan), improve retention, or increase RC affiliations among pilots who separate. Retention will likely get worse as national economic conditions improve and the labor market for pilots becomes more competitive. Increasing RC affiliations, however, may have some potential.

Annual affiliation rates reached 80 percent during the period from which we drew data for hits analysis (FY2001 through FY2011), and we feel that throughout most of this period affiliations were demand-constrained in that RC units had more applicants than available positions. We were advised that most units carried a waiting list throughout much of the period. It will, however, require affiliation rates above 95 percent to reduce the total force production requirement below 278.

Additional Thoughts on Absorption and Sustainability

We see that active associations, coupled with classic associations as necessary, can certainly improve absorption and sustainability circumstances for the current fighter pilot problem. We have a symbiotic relationship among the components because, while the RC units are absorbing pilots directly for the AC, the expected value of RC service for each of these (and other) AC-absorbed pilots is four years, so the RC units are definitely getting a return on their investment.[50]

We also get an interesting perspective if we look at the additional absorption generated by active associations on a per-aircraft basis. We will take a 24-aircraft RC squadron as an example. When nine AC pilots are placed in the squadron, it is basically equivalent to devoting a certain proportion of the RC force structure to AC operations. If we distribute the aircraft based on crew ratio, we are devoting 7.2 (= 9/1.25) of the RC aircraft to AC operations.[51] Seven of the AC pilots are in the absorption process, which requires 2.25 years per pilot. Thus, the unit is absorbing 7/2.25 = 3.11 AC pilots per year in 7.2 airframes, or 3.11/7.2 = 0.432 pilots per airframe with its AC contingent. This compares favorably with the 0.269 pilots per airframe that can be absorbed in non-associated AC units.

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[50] Recall that the joint probability of a pilot's not taking a continuation bonus and affiliating is 0.4, so the corresponding expected value is 0.4 x 10 = 4, because affiliations will serve 10 years on average in the RC.

[51] We acknowledge that that we would get a slightly larger number of airframes devoted to AC operations if we made this distribution based on flying hours required to achieve RAP minimums. This is because AC pilots typically have higher RAP requirements than RC pilots.

Appendix E. Remotely Piloted Aircraft Force Composition Analyses Performed by the Air Force Total Force Integration Office (AF/A8XF)

Early in FY2012, AF/A8XF was tasked to look at RSO and LRE total force bed-down options in order to support the FY2017 goal of 65 steady-state CAPs and an additional 20 surge CAPs. All options assumed a stabilized 10:1 crew ratio by FY2017. They constructed ten RSO and six LRE options, focused on the 38 ACC distribution CAPs. They did not assess the 10 Air Force Special Operations Command (AFSOC) or 17 other government agency (OGA) CAPs, which are part of the 65 CAP total.

The implementation and continuing costs associated with these options were analyzed. Implementation costs were driven primarily by required equipment costs and not by facility requirements, since these bed-downs are generic and not tied to any particular base. Continuing costs were driven primarily by personnel costs through changes in AC and RC associated force structure.

Remote Split Operations

Table E.1 lists the parameters of the RSO force mix options (FMOs).

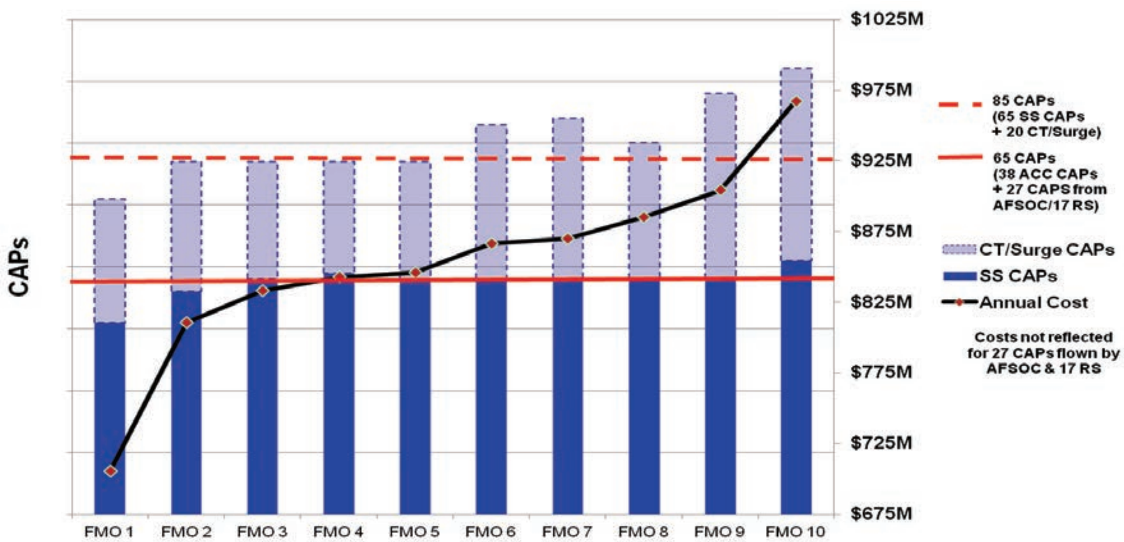
Table E.1. Total Force Enterprise Remote Split Operations Force Mix Options

FMO	AC/RC Pers %	AC/RC Units %	Squadrons	SS Surge CAPs	Manpower	Manpower Delta from Option 2	Annual $ Transition $
1 Current State	~45/55	38/62	5 RegAF (2 AFRC CA) / 6 ANG	31 (58) 17 (20)	AC: ~1,087 RC: ~1,309	AC: ~–195 RC: ~–78	$705 M N/A
2 A8X Baseline	48/52	35/65	6 RegAF (5 AFRC CA) / 6 ANG	36 (63) 18 (21)	AC: 1,282 RC: 1,387	AC: N/A RC: N/A	$811 M N/A
3 w/ CA & 3+2 AA	49/51	50/50	4 RegAF (4 AFRC CA) / 6 ANG (6 AA) • Eliminates 2 RegAF and 1 CA • Adds RegAF to AAs for 3 + 2	38 (65) 16 (19)	AC: 1,273 RC: 1,348	AC: –9 RC: –39	$833 M $30M +
4 UE	66/34	64/36	7 RegAF / 4 ANG • Adds 1 RegAF • Eliminates 5 CA and 2 ANG	39 (66) 15 (18)	AC: 1,589 RC: 805	AC: +307 RC: –582	$843 M $37 M
5 w/ CA & 2+1 AA	51/49	42/58	6 RegAF (5 AFRC CA) / 6 ANG (2 AA) • Adds 2 AAs	38 (65) 16 (19)	AC: 1,358 RC: 1,273	AC: +76 RC: –114	$846 M $3 M
6 UE	47/53	43/57	6 RegAF / 8 ANG • Eliminates 5 CA • Adds 2 ANG	38 (65) 22 (25)	AC: 1,362 RC: 1,548	AC: +80 RC: +161	$866 M $72 M
7 w/ CA & 3+2 AA	32/68	50/50	1 RegAF (1 AFRC CA) / 11 ANG (11 AA) • Eliminates 5 RegAF and 4 CA • Adds 5 ANG and 11 AAs • Adds RegAF to AAs for 3 + 2	38 (65) 23 (26)	AC: 994 RC: 2,152	AC: –288 RC: +765	$870 M $159 M +
8 w/ CA & 2+1 AA	36/64	46/54	4 RegAF (2 AFRC CA) / 11 ANG (7 AA) • Eliminates 2 RegAF and 3 CA • Adds 5 ANG and 7 AA	38 (65) 19 (22)	AC: 1,137 RC: 2,044	AC: –145 RC: +657	$885 M $148 M
9 w/ CA & 3+2 AA	33/67	27/73	5 RegAF (5 AFRC CA) / 11 ANG (1 AA) • Eliminates 1 RegAF • Adds 5 ANG and 1 AAs • Adds RegAF to AA for 3 + 2	38 (65) 27 (30)	AC: 1,123 RC: 2,308	AC: –159 RC: +921	$904 M $146 M +
10 ACC Plan w/ CA	36/64	27/73	6 RegAF (5 AFRC CA) / 11 ANG • Adds 5 ANG	41 (68) 28 (31)	AC: 1,282 RC: 2,308	AC: 0 RC: +921	$966 M $97 M

SOURCE: AF/A8XF, Total Force Enterprise RPA Force Composition Analysis.
NOTES: UE = unit equipped, AA = active associate, CA = classic associate.

Figure E.1 summarizes the resulting CAP capabilities and annual recurring costs.

Figure E.1. RSO FMO Results



SOURCE: 2012 AF/A8XF, Total Force Enterprise RPA Force Composition Analysis

FMOs 1 and 2 do not meet the goal of 65 steady-state CAPs. Note also that most of these FMOs have a ratio of AC to RC strength that is likely to present sustainability problems, using the sustainability criteria discussed in Chapter Three.

Launch and Recovery Elements

Table E.2 lists the parameters of the six different LRE FMOs.

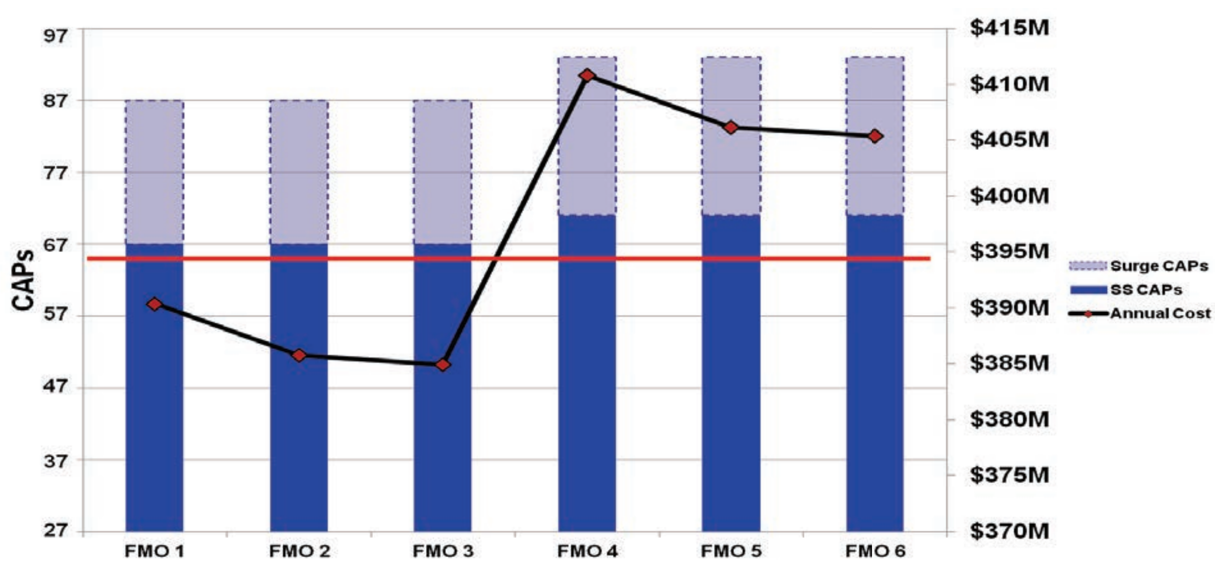
Table E.2. Total Force Enterprise Launch and Recovery Element Force Mix Options

FMO	AC/RC Pers %	AC/RC Units %	Squadrons	SS Surge CAPs	Manpower	Manpower Delta from Option 1	Annual $ Transition $
1 ACC Baseline UE	91/09	63/37	5 RegAF / 3 ANG	40 (67) 60 (87)	AC: 2,598 RC: 243	AC: N/A RC: N/A	$390 M N/A
2 w/ CA	88/12	50/50	5 RegAF (2 AFRC CA) / 3 ANG • Adds 2 CA	40 (67) 60 (87)	AC: 2,486 RC: 336	AC: -112 RC: +93	$386 M $2 M
3 w/ CA	87/13	45/55	5 RegAF (3 AFRC CA) / 3 ANG • Adds 3 CA	40 (67) 60 (87)	AC: 2,469 RC: 352	AC: -129 RC: +109	$384 M $3 M
4 w/ AA	92/08	73/27	5 RegAF / 3 ANG (3 AA) • Adds 3 AA	44 (71) 66 (93)	AC: 2,876 RC: 236	AC: +278 RC: -7	$410 M $6 M
5 w/ CA & AA	89/11	62/38	5 RegAF (2 AFRC CA) / 3 ANG (3 AA) • Adds 2 CA • Adds 3 AA	44 (71) 66 (93)	AC: 2,764 RC: 329	AC: +166 RC: +86	$406 M $7 M
6 w/ CA & AA	88/12	57/43	5 RegAF (3 AFRC CA) / 3 ANG (3 AA) • Adds 3 CA • Adds 3 AA	44 (71) 66 (93)	AC: 2,747 RC: 345	AC: +149 RC: +102	$405 M $8 M

SOURCE: AF/A8XF, Total Force Enterprise RPA Force Composition Analysis

Figure E.2 summarizes the resulting CAP capabilities and annual recurring costs.

Figure E.2. LRE FMO Results



SOURCE: 2012 AF/A8XF, Total Force Enterprise RPA Force Composition Analysis

All FMOs meet the goal of 65 steady state and 20 surge/continuation training CAPs. All FMOs easily meet sustainability considerations. FMO 1, which is the 2012 ACC baseline FMO, provides the smallest RC percentage at 9 percent of the total personnel. Since this mission has extremely high deployment requirements, the smaller percentage is preferred.

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