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Options for Meeting the Maintenance Demands of Active Associate Flying Units

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Prepared for the United States Air Force

PROJECT AIR FORCE

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Summary

As the Air Force faces end strength reductions and force structure changes, it becomes more difficult to support the AEF construct using current force employment practices. To meet congressionally mandated end strength ceilings, the Air Force must eliminate approximately 40,000 active duty personnel in the next several years, without sacrificing operational capabilities. If the Air Force desires to keep pilot production at or near 1,000 pilots per year,[1] alternative organizational structures and resource utilization need to be considered. One of these alternative solutions is to use associate units[2] of the highly experienced ANG workforce and the increased PAA per ANG unit (as a result of the QDR and BRAC decisions) to relieve some of the burden of active component pilot training. With that goal in mind, PAF was asked by senior leaders, both in the ANG and on the Air Staff,[3] to evaluate asso-

[1] The Four Star Summit in 1996 set Air Force pilot production goals at 1,100 (total) and 370 for fighters. Since that time, the fighter goal was slightly reduced and shared with the reserve component (Four Star Summit in April 1999). At the 2003 CORONA, both production goals were reduced by approximately 10 percent. *Transformational Aircrew Management for the 21st Century Tactical Communication Plan* currently lists 1,000 plus or minus 5 percent as the annual Air Force pilot production goal (U.S. Air Force, *Transformational Aircrew Management for the 21st Century Tactical Communication Plan,* May 15, 2007).

[2] An *active* associate unit, also called a reverse associate unit, is an ANG (or Air Force Reserve) unit in which a cadre of active component personnel is permanently assigned to *associate,* or work, with the reserve component unit at the reserve component unit's location.

[3] This analysis was requested by the director of the ANG Bureau and the Directorate of Total Force Integration (AF/A8F) and supported by the active and reserve components' senior staff.

ciate unit maintenance organizations, which could be used to train junior maintenance personnel and to help relieve the burden of active component pilot training.

The research in this monograph focuses on options for how best to meet the requirements for active associate unit aircraft maintenance if some of the active component pilot training requirements were transferred to the ANG. The analysis is divided into two parts. The first concentrates on understanding the differences between ANG and active component aircraft maintenance productivity. The second part uses the key factors to establish staffing options for an active associate unit in which the goal of the unit is to produce trained pilots in the most efficient manner possible. To understand the staffing requirements, a model is used to determine whether a second shift would be required at an active associate unit.

Past RAND analyses found that an ANG unit is able to generate its peacetime training sorties with a fairly small full-time workforce[4]—about one-third the size of the traditional active component organization. Table S.1 compares the total programmed flying hours per full-time maintainer of all Air Combat Command (ACC) F-16 bases with those of all ANG F-16 bases.

Key Factors in the Differences in Productivity

The first part of the analysis focuses on understanding productivity differences (see pp. 7–30). Using past research and discussions with key personnel, we derived the following list of potential key factors:

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[4] Robert S. Tripp, Kristin F. Lynch, Ronald G. McGarvey, Don Snyder, Raymond A. Pyles, William A. Williams, and Charles Robert Roll, Jr., *Strategic Analysis of Air National Guard Combat Support and Reachback Functions,* Santa Monica, Calif.: RAND Corporation, MG-375-AF, 2006; and Kristin F. Lynch, John G. Drew, Sally Sleeper, William A. Williams, James M. Masters, Louis Luangkesorn, Robert S. Tripp, Dahlia S. Lichter, and Charles Robert Roll, Jr., *Supporting the Future Total Force: A Methodology for Evaluating Potential Air National Guard Mission Assignments*, Santa Monica, Calif.: RAND Corporation, MG-539-AF, 2007.

Table S.1
Comparison of Active Component and ANG F-16 Programmed Flying Hours per Full-Time Equivalent Maintenance Authorization for Fiscal Year 2005

	Combat Coded F-16 Units	
	ACC	ANG
PAA[a]	198	291
Programmed flying hours (PFH) [b]	53,222	76,586
Full-time authorizations[c]	5,629	3,039
Part-time authorizations	0	5,201
Total authorizations	5,629	8,240
Full-time equivalents (FTE)	5,629	3,559
PFH/FTE	9.5	21.5

[a] Manpower data are based on authorizations, not actual fill rates. PAA data for ACC and ANG are from Air Combat Command, Directorate of Logistics, Maintenance Analysis Division.

[b] Programmed flying hour data are from U.S. Air Force, *Air Combat Command, Directorate of Maintenance and Logistics, Ten Year Lookback Standards and Performance FY96–FY05,* HQ Air Combat Command, Directorate of Maintenance and Logistics, December 2005a, and the ANG, Director of Logistics, (ANG/LG).

[c] Full-time authorizations data are from U.S. Air Force, Directorate of Maintenance, Base Level Policy Division (AF/A4MM).

(1) wartime versus peacetime manning factors; (2) out-of-hide duties[5]; (3) on-the-job training (OJT) requirements; (4) supervisory policies; (5) shift or scheduling and utilization efficiencies; (6) depth and range of experience and cross-utilization; and (7) personnel availability. For example, we might expect to see a difference in peacetime productiv-

[5] Out-of-hide responsibilities are those duties that are performed by a maintainer but are not earned through a Logistics Composite Model allotment—for example, the squadron resources manager, squadron small computer manager, dormitory manager, squadron safety noncommissioned officer (NCO), and squadron mobility NCO.

ity, because unit maintenance manpower is sized for wartime flying requirements, which are significantly higher than the unit's peacetime flying requirements. A review of active component flying activity indicates that active duty units may, in fact, be working at or near their full capacity. Therefore, wartime versus peacetime staffing policies do not account for the standards-based differences in ANG and active component productivity, and we do not consider them to be a key factor.[6] Table S.2 summarizes other possible key factors that may contribute to the standards-based differences between ANG and active component peacetime-training sortie generation.

Assessments were developed based on detailed empirical data and expert judgments to quantify the relative effect of each of these factors on a unit's productivity. Figure S.1 illustrates the relative importance of each of the key factors that influence maintenance productivity in an active component maintenance unit. Based on the analysis presented in this monograph (see Chapter Two), a typical active component unit experiences approximately 47 percent of its maximum potential effectiveness per assigned person. In comparison, an ANG unit achieves approximately 90 percent effectiveness per person. The difference in effectiveness between the ANG and active duty units is directly attributable to distinctions in training burdens, availability of manpower, experience levels, and related management practices (see Figure S.1). If these key factors were equal for the active component, the active component and ANG units' net effectiveness could be similar.

While the focus of this study is on F-16 aircraft maintenance, many of these factors (for example, out-of-hide duties, OJT, depth and range of experience, and personnel availability) could affect productivity in other mission areas as well. The relative value of the factors may differ among mission areas, but the factors themselves could influence productivity of other Air Force operations.

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[6] The effects of split operations (in which part of a unit is deployed forward and part of the unit remains in the rear) and fill rates (assigned personnel versus authorized personnel) are not captured in this analysis. Units may be authorized a certain number of maintainers, but the fill rate could be much lower or have a higher percentage of trainees. Both split operations and the fill rate could affect the results of this analysis.

Table S.2
Comparison of Active Component and ANG Maintenance Organizations

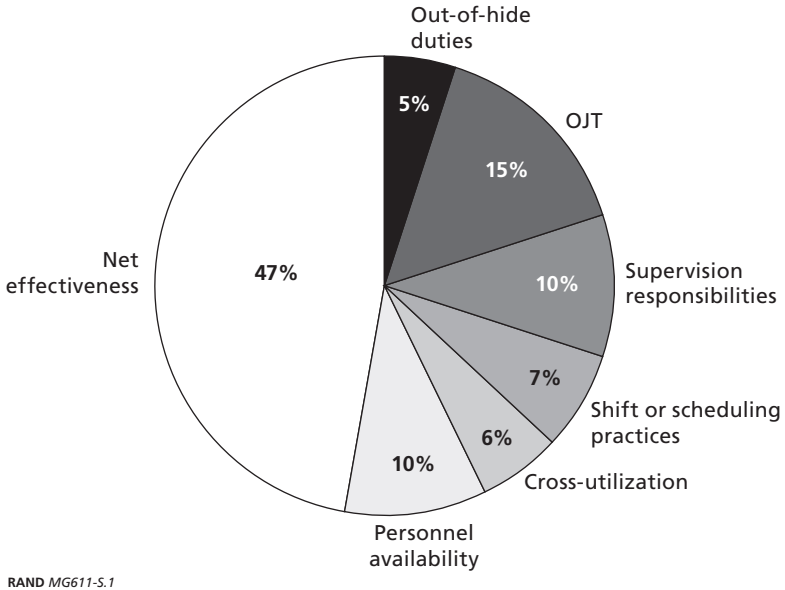
Factor	Active Duty Units	ANG Units
Out-of-hide duties	5% of authorized slots	Negligible
OJT requirements	20% are trainees and are only 40% productive; trainers are 85% productive[a]	Negligible
Supervisory policies	E-7, E-8, and E-9[b] are full-time supervisors	Most supervisors also perform maintenance
Shifts or scheduling	Most maintenance functions run two full shifts[c]	Single-shift maintenance
Depth and range of experience and cross-utilization	Typical enlisted maintainer has 7 years' experience	A typical enlisted maintainer has about 15 years' experience
Personnel availability	Enlisted maintainers spend two days per month on unit training	Full-time techs complete unit training during unit-training assembly (drill weekend) and use leave to do annual training

[a] Steven A. Oliver, *Cost and Valuation of Air Force Aircraft Maintenance Personnel Study,* Maxwell AFB, Gunter Annex, Ala: Air Force Logistics Management Agency, August 2001; Mark J. Albrecht, *Labor Substitution in the Military Environment: Implications for Enlisted Force Management,* Santa Monica, Calif.: RAND Corporation, R-2330-MRAL, 1979; and Carl J. Dahlman, Robert Kerchner, David E. Thaler, *Setting Requirements for Maintenance Manpower in the U.S. Air Force,* Santa Monica, Calif.: RAND Corporation, MR-1436-AF, 2002.

[b] Master sergeants, senior master sergeants, and chief master sergeants.

[c] U.S. Air Force, 2004, authorizes three-shift maintenance at active duty locations.

Figure S.1
Effects of Key Productivity Factors at an Active Component Maintenance Unit



Evaluating Active Associate Maintenance Organization Options

To evaluate options for meeting active associate maintenance requirements, computer simulation models and rules-based applications, which were developed for this analysis, were used to model the flying program and shift operations (see pp. 31–42). Supporting the training of additional pilots requires providing additional training sorties, which would increase the aircraft utilization (UTE) rate. Before active associate staffing requirements could be evaluated, we needed to understand the flying program and how increased maintenance workload might drive a two-shift operation.

To evaluate staffing requirements for an active associate unit, the unit tasking scenario should include the additional PAA added by BRAC, the increased UTE rate in support of TFI requirements, and the personnel impact of a second maintenance shift should it prove necessary (see Table S.3). Taking these into consideration, a unit may need to increase by 45 personnel to run a second shift, which may be required with an increased UTE rate.

Table S.3
Increased PAA and UTE Rate Effects on the Active Associate F-16 Unit

		TFI Scenarios	
	Current	One Shift	Two Shifts
Unit metrics			
PAA	15	18	18
UTE rate[a]	15	18.4	18.4
Average sortie duration (ASD)	1.3	1.3	1.3
PFH (or PAA × UTE rate × ASD)	3,510	5,167	5,167
Manpower authorizations			
Staff	19	22	26
Aircraft maintenance squadron	56	66	68
Maintenance Group leadership	4	4	5
Equipment maintenance squadron	26	33	33
Component maintenance squadron	41	53	59
Total	146	178	191
TFI UTE rate Δ		32	32
Second shift Δ			13
Total increment		32	45

NOTES: The "current" column does not represent any specific unit. Rather, it is a generalized view of what an ANG unit with 15 PAA is accomplishing today. The manpower breakout, however, is closely modeled after the 180 Fighter Wing (FW), Toledo Air Guard Station.

[a] UTE rates are calculated based on crew ratios and pilot training requirements. Pilot training requirements are defined by the Ready Aircrew Program, which differs for each Air Force component—ANG, the reserves, and the active component.

Summary of Findings

There are several factors that contribute to the ANG F-16 unit generating more peacetime flying hours per FTE maintainer than does an active component F-16 unit. First, the ANG, by its very nature, is made up of units possessing a highly experienced workforce. Historically, ANG members remain in the same location much longer (with an average of 15 years experience) than their active component counterparts (with an average of 7 years experience), which deepens their knowledge. Because of their extensive knowledge, the ANG is able to cross-train many of its personnel. Second, the traditional ANG unit recruits its full-time maintenance force (technicians) from a pool of fully qualified applicants. Thus, the unit is able to spend more time on direct production tasks and less time performing initial or upgrade maintenance training than a comparable active unit does. The active component, on the other hand, has a large number of inexperienced maintainers who require hands-on maintenance training and supervision. Active component personnel also have other military duties that reduce their relative availability to perform hands-on maintenance. Finally, the typical active component unit operates two maintenance shifts per day. While two shifts can make a unit very effective, this schedule is inherently less efficient. Most ANG units operate only a single maintenance shift to support peacetime flying sortie generation.

The methodology developed in this monograph can be used to quantify and compare the key factors that allow the ANG to generate peacetime pilot training sorties with a fairly small full-time technician workforce. By applying the methodology to proposed future operations and the proposed TFI associate unit initiatives, this approach can demonstrate how various types of personnel can influence the size and productivity of a proposed unit. If the focus of the TFI initiatives is to improve efficiency, use of full-time ANG maintainers to provide peacetime training sorties for active component pilots may be a viable solution.