Chapter One

INTRODUCTION

The current pilot shortage has left the U.S. Air Force facing unusual aircrew management challenges. Many operational units have too many pilots while other organizations struggle to get the job done with too few.1 How can both of these problems occur simultaneously?

The short answer is that the rates currently programmed for producing new fighter pilots are too low to sustain outyear requirements unless unprecedented improvements in retention can be achieved. Yet these rates will produce more newly trained fighter pilots than can be absorbed into associated weapon systems even if an extremely ambitious catalog of related objectives could be met.2 Having too many new pilots in the absorbing units will dilute and degrade training to the detriment of readiness and combat capability. Simultaneously, critical vacancies will remain in key staff elements and other agencies that require the expertise of experienced pilots.

Aircrew management is an even greater challenge following an extended period in which an ambitious national strategy, coupled with

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1Operational units are the units tasked to perform the primary combat or combat support mission associated with a weapon system.

2Air Force Instruction (AFI) 11-412 defines absorption as “the number of inexperienced crewmembers that can be assigned to a major weapon system per year.” (See Department of the Air Force, AFI 11-412, Aircrew Management, August 1, 1997.) We will develop this concept and address the factors that govern the numbers in later chapters. At this point, we need to stress that newly trained pilots can be absorbed only in operational units.
inadequate force structure and funding levels, resulted in marked tasking increases for a shrinking number of operational fighter units together with dwindling training resources available in the remaining units. Budgetary shortfalls precluded or delayed modernization programs to replace aging aircraft. Unexpectedly low pilot retention rates since 1997 contributed significantly to the problem’s severity.\footnote{That the Bottom-Up Review produced an ambitious national military strategy supported by an inadequate and underfunded force structure is a major conclusion in Eric V. Larson et al., \textit{Defense Planning in a Decade of Change: Lessons from the Base Force, Bottom-Up Review, and Quadrennial Defense Review}, MR-1387-AF, Santa Monica: RAND, 2001. That report also documents the budgetary disconnects that derailed Air Force aircraft modernization efforts. The degradation in flying hours and other training resources began after the Persian Gulf War and continued essentially unabated until the trend was finally reversed with a concerted Air Force–wide effort to fly its annual flying hour program in FY 2000.}

This report explains the complex causes of these problems and confirms that there is no simple resolution. We will provide evidence that if the current “steady-state” approach toward aircrew management is sustained without a more fundamental appreciation of the real-time behavior of the aircrew management system, drastic negative consequences could result. These consequences can occur whenever the system operates in a regime in which small changes in key parameters can drive it across “break points” that generate dramatic changes. The continuing requirement for many new pilots, however, will virtually ensure that the Air Force will be required to manage the system successfully in such regimes unless force structure can be increased in the active component. Thus, aircrew managers and decisionmakers must fully appreciate the dynamic behavior of the system in order to recognize instabilities and avoid their potential consequences, especially when the system is forced to operate under unstable or near-unstable conditions.

As we develop and define the relationships that characterize system behavior from a dynamic as well as a steady-state perspective, we will provide a historical context from which to evaluate and apprehend the issues involved. We assign parameter values to establish a best-case scenario (BCS) on which to base our numerical excursions. Existing Air Force objectives are not consistent in the sense that they are not simultaneously achievable even under these best-case circumstances. Traditional aircrew management methods fail because
they assume that their objectives are compatible and that this compatibility will in turn drive the system toward a viable steady-state condition that achieves the objective values. When the objective values are not consistent, however, the system moves toward different equilibrium conditions, necessitating that more sophisticated methods be used to analyze the resulting relationships. Our numerical excursions confirm that a reliance on traditional methods alone could easily take operational fighter units into uncharted territory in terms of their manning and experience levels. This is important because these conditions can easily threaten the system’s sustainability.

Chapter Two of this report examines empirical evidence that illustrates the consequences of operating fighter units in the unstable regime to which we have referred. We also explore the circumstances that enabled some units to avoid these adverse conditions.

Chapter Three begins by reviewing pilot requirement categories and their characteristics, which explain why new pilots can be absorbed only in operational units. It then looks at the training pipeline new pilots must complete to enter a weapon system inventory because no other inventory entry points are available. In this chapter, we review the steady-state equations that estimate inventory size and conclude that current fighter pilot production and retention rates will never provide an inventory that meets the relevant requirements. Retention and production excursions illustrate the extent of these inconsistencies.

Chapter Four contains a catalog of the parameters that influence absorption capacity. Definitions and relationships (including mathematical equations) are included. The discussion incorporates historical content where necessary to provide background and perspective.

Chapter Five presents the BCS’s parameter values and discusses why we regard these values as representing a best-case situation. Numerical excursions demonstrate the inconsistencies associated with existing Air Force policy objectives. Using model results, we demonstrate that traditional steady-state options will place operational units in conditions very similar to those we documented in Chapter Two. Only sizable increases in the units’ abilities to generate training capacity can yield acceptable steady-state conditions.
Finally, Chapter Six discusses the implications of these results and examines alternative remedies. No single alternative is likely to ensure that compatible objectives can be achieved unless one or more of the best-case parameter values can be attained. Some combination of alternatives will be needed, and the objectives will remain incompatible as the system evolves. This further emphasizes the need for more sophisticated analytic tools.