

The Fifth-Generation Fighter Pilot Force

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The latest generation of combat aircraft provides us with amazing capabilities and an intractable problem. The cost of leading-edge technology is making these systems unaffordable in large numbers. Somehow we must get the needed combat capability—determined by the threat—from a constrained fleet.

Fifth-generation fighters like the F-22 and F-35 bring unparalleled capabilities to the fight. However, these platforms come at a cost. The original USAF proposal for 750 F-22 Raptors was reduced to 339 for operational reasons through the *Report on the Bottom-Up Review* and *Report of the Quadrennial Defense Review* after the breakup of the Soviet Union in 1991.¹ The F-22 program spent all the money originally budgeted for 399 aircraft yet bought only 188.² Not counting test, training, and Reserve aircraft, the Air Force should end up with about 126 combat-coded planes.³ The 1998 budget limited the engineering and manufacturing development plus production costs for the F-22 program to \$62 billion. By 2010 the Department of Defense had estimated the total spent to be \$67 billion. Anyone can easily pick at those numbers. Development problems, changing requirements, inflation adjustments, and so forth, are all factors. However, they do not change the result for the public who pays the bills and the members of Congress who represent them. They gave us the money, and we spent it all.

The history and current status of the F-35 program seem to be following a similar path. What we learn from this admittedly small historical sample is that we are likely to see lower numbers than we would like, making it imperative that we get the most out of every airframe.

Of course, simple numbers of aircraft are not capability. For the air component commander, capability includes what aircraft bring to the fight as well as how many are in the fight at the time. The key is how often we can put those relatively few aircraft into the fight and keep them there—captured in the aircraft utilization rate (how many hours per month an aircraft flies). More hours in the air for each aircraft equal more hours/sorties in the fight. That is the real metric to measure combat capability.

More time in the fight means less time on the ground. While we know how to hot-turn aircraft to rearm and refuel them quickly, just making a rapid turnaround will not solve the problem. The aircraft may be happy with a quick fill-up and reload, but the same cannot be said of the aircrew. There are fundamental limits to

human endurance, and a combat sortie is not the place for anything less than peak performance.

Although crew ratios (CR) vary, the traditional USAF fighter squadron has 30 pilots for 24 aircraft or a 1.25:1 CR. With a few pilots detailed as planners or higher headquarters liaisons—or on the sick list—the deployed squadron can be quickly reduced to an effective 1:1 CR with one pilot per aircraft. For comparison, World War II single-engine fighter groups were also manned at one pilot per aircraft.⁴

Consequently, the combat capability available is limited by the human part of the system. People have a limited amount of endurance and a minimum amount of recovery time before reengaging. Crew duty-day constraints and crew-rest requirements can be waived, but it seems that doing so while conducting multiple, high-stress combat sorties is counterproductive. To overcome this limitation, we need to expand our hot turn to include refueling, rearming, and recrewing the aircraft.

This concept is not new for the USAF. It is built into the way we operate the airlift fleet. We maintain several crews (active duty and Reserve) for each aircraft in the inventory and position those crews to keep the aircraft moving.

We can do the same thing with a fifth-generation crew force for the fifth-generation fighter force. As each crew reaches its fatigue limit, the aircraft is quickly relaunched with fresh personnel and returns to the fight. Exactly how many crews are needed per aircraft will depend on theater requirements. For a quick example, let's assume a 2:1 CR.

Two crews per aircraft allow almost continuous utilization of each airframe. Instead of one sortie per aircraft daily, we get two. Each crew does a normal 12-hour duty day (planning, flying the mission, and debriefing) followed by 12 hours of recovery in crew rest.

With one simple change, we can turn 126 combat-coded airframes into 252 capable aircraft. Unfortunately, the situation is not quite that simple. Airplanes, like aircrews, need care and feeding. Logisticians know there's no such thing as a free lunch. Where do we get the people, spares, and consumables to double the aircraft utilization rate? How long will the airframes last?

The solution is to look at the original fighter program. An F-22 program with 339 aircraft is more than engineering and manufacturing development and acquisition funding. It includes enough aircrews, support personnel, spares, and so forth, in the out years to operate and maintain those planes. Congress only refused to provide increased funding to buy more airframes. If the Air Force simply maintained the remaining funding lines in the program, then we get the people and parts we need.

These costs are not trivial. Doubling the CR doubles the personnel and training expenses. We must pay not only for twice the number of aircrews per airframe but also for twice as many maintainers on the flight line and in the back shops. Those maintainers will also need roughly twice as many spare parts to keep the aircraft flying.

Airframe life is another constraint. If we fly more hours per aircraft, the basic structure of the airplane will wear out sooner. Although we can mitigate this situation with service-life extension programs, remanufacturing major components, and so forth, these costs are additional. Reducing peacetime training hours may be possible with increased use of simulators although doing so also involves cost increases as

the fidelity and capability of the simulators improve. Ultimately, we should expect to have to replace the aircraft sooner.

The need to squeeze the most combat capability from a limited inventory has not gone entirely unnoticed. Brig Gen Peter Pauling, former commander of the Hawaii Air National Guard's 154th Wing, stated a preference for at least a 1.5 CR for the F-22.⁵ Faced with a very limited number of F-35s, the Royal Netherlands Air Force is planning to man those aircraft at a 2.0 CR.⁶

Intentionally or not, the Air Force and Congress have decided that the additional combat capability is not worth the cost. The result is an Air Force operating the fifth-generation fighter force just as we did the first. ☹

Notes

1. Les Aspin, *Report on the Bottom-Up Review* (Washington, DC: Department of Defense, October 1993), <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA359953>; and William S. Cohen, *Report of the Quadrennial Defense Review* (Washington, DC: Department of Defense, May 1997), <http://www.dod.mil/pubs/qdr/>.

2. Jeremiah Gertler, *Air Force F-22 Fighter Program*, CRS Report RL31673 (Washington, DC: Congressional Research Service, 11 July 2013), 9–10.

3. Larry Lawson, executive vice president and F-22 Program general manager, Lockheed Martin, quoted in David Fulghum, "Raptor's Edge," *Aviation Week and Space Technology* 170, no. 6 (9 February 2009): 25.

4. Wesley Frank Craven and James Lea Cate, eds., *The Army Air Forces in World War II*, vol. 6, *Men and Planes* (1955; new imprint, Washington, DC: Office of Air Force History, 1983), 59.

5. Quoted in David A. Fulghum, "Raptors Remain on Course for Hawaii," *Aviation Week and Space Technology* 171, no. 5 (3 August 2009): 49.

6. Tony Osborne, "Fast and Furious: F-35 Buy Will Quicken Evolution of Netherlands Air Force, Says Commander," *Aviation Week and Space Technology* 177, no. 24 (7–20 December 2015): 35.



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