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You Can Be Too Skinny To Fly the F-35

Weigh less than 136 pounds? No Joint Strike Fighter for you.



By Eric Tegler Nov 3, 2015 @ 4:04 PM Military Pilots



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When it comes to flying America's newest fighter aircraft, waifs need not apply. However, it's not because the Pentagon only oversized, muscle-pound pilots in the F-35. A combination of ejection seat and helmet issues have forced the Air Force to prohibit pilots who weigh less than 136 pounds from flying the F-35 until some new design solutions can be implemented.

So far the restriction, [announced in October](#), is more just another weird hiccup for the F-35 program than it is a major inconvenience. It has displaced one F-35 pilot so far, who has been re-assigned to another aircraft type, according to USAF spokesman, Maj. Kelly Jeter. Interestingly, the weight threshold snagged a male pilot. The only female F-35 pilot remains on flight status.

What's the problem? The sequence and physics of pilot ejection have yielded several problems in the F-35. The first phase of an ejection, called the catapult, is when the seat gets blasted out of the airplane by accelerating up vertical seat rails. As the pilot rises with the seat, his or her neck is compressed.

Tests in August revealed that pilots risked injury associated with neck compression resulting from the heavier, display-loaded helmets specific to the F-35. That helmet, built by Rockwell Collins and Elbit Systems of America, has endured repeated technical problems related to its built-in display. More importantly, in this case, is that it's relatively heavy (5.1 lbs). According to F-35 Program Executive Officer Lt. Gen. Christopher C. Bogdan (who testified before the House Armed Services Committee late last month), testing revealed that the neck stresses for lightweight pilots exceeded what is considered safe if the helmets weigh more than 4.8 pounds. The F-35 Program Office has contracted with Rockwell Collins to build a Generation III "Light" helmet that will be at least six ounces lighter than the current version. It will be ready in about a year.

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Curiously though, Gen. Bogdan says it was not the helmet alone that gave rise to the pilot weight restriction. In fact, the pilot who has since been affected by the new rule actually flew, "because we hand-built him a helmet that weighed 4.7 pounds." The problem ultimately responsible for the flight restriction, Bogdan says, stems from the design of the F-35's Martin-Baker ejection seat that is supposed to accommodate pilots between 135 and 245 pounds.

During the phase of the ejection when the parachute on the back of the seat comes out (called "opening-shock") the pilot's head snaps forward and is also buffeted by the wind. Testing demonstrated the opening-shock to be too strong for lightweight pilots, "causing the neck-loads to be above what we would consider safe," the general explained.

The forthcoming solution from Martin-Baker and the Program is to delay the parachute's deployment by a fraction of a second. The pause allows the seat to decelerate enough that the force isn't as severe when the parachute pops. New seats will be configured with a switch that lightweight pilots will flip before taking off, signaling a delay in chute deployment. Martin-Baker is reportedly also mounting a head support panel between the parachute risers that will protect the pilot's head from buffeting during parachute opening.

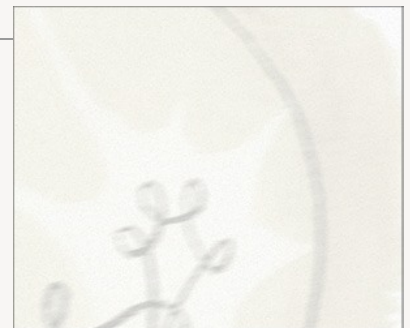
With these fixes implemented by summer 2017, the military will be able to remove these weight restrictions. The probability of injury during ejection from an F-35 will be 23 percent, on par with the risk in current front line fighters. However, the general's assertion contradicts a [recent Air Force statement](#) acknowledging an "elevated level of risk" for pilots between 136 and 165 pounds. The statement also noted that risk of critical injury during an ejection is higher for the F-35 seat than older fighter-ejection seats.

As always, the safest course is not to have to eject from a moving airplane at all, but especially if you're built like Kate Moss.

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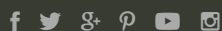
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