**war stories**

# Shooting Down Missile Defense

Even the Pentagon admits the program is in trouble.

By Fred Kaplan

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If the generals in charge of the Pentagon's Missile Defense Agency followed the wispiest trail of logic, they would have slashed the program and moved on to more promising pursuits long ago. This month brings yet another bit of news (for earlier bits, click here and here) indicating not only that the program has scant chance of producing a workable missile-defense system, but that its managers *know* of its dim prospects.

The latest flash, from the Aug. 1 edition of the trade journal *Defense News*, is that the agency has suspended one of the program's most crucial components on the grounds that the technology it involves is "not mature enough" to fund.

The component is called the space-based kinetic-energy boost-phase interceptor, a name that sounds too esoteric to deserve notice (and, indeed, no mainstream paper seems to have picked up on the report of its suspension), but in fact the news is a bombshell.

The missile-defense program—for which President Bush is spending $9.1 billion next year alone, with steady increases planned in future years to infinity—envisions, ultimately, a three-layered system. The boost-phase interceptors will shoot down enemy missiles in the first three or four minutes after they've been launched, as they ascend through the atmosphere into the edge of outer space. The "midcourse-defense interceptors" will fire at the missiles during the 20 minutes that they arc across the heavens. The "terminal-defense interceptors" will shoot down the missiles that survive the earlier layers in their final minutes of flight, as they plunge back down to earth toward their targets.

Of the three layers, boost-phase intercept (BPI) is the most important—and, theoretically, the easiest. An enemy missile is most vulnerable at this stage. It hasn't yet separated from the rocket booster, so it's very large. The booster's engines are still blazing, so it's a highly "visible" target to a wide variety of sensors (optical, radar, or heat-seeking). And it's moving relatively slowly.

The key limitation to BPI, even on a theoretical level, is that the anti-missile interceptor has to be fairly near—preferably, right above—the enemy's launch site. But if it can be well-positioned, this is the layer where the pickings are ripest.

In fact, many discussions of multilayered defenses assume that the later layers will be devoted mainly to mopping up the few missiles that the boost-phase interceptors missed. To put it another way, without BPI, the other layers will almost surely be oversaturated even by a relatively "small" attack.

Late last year, officials from the Missile Defense Agency told industry reps that they planned to start pursuing a space-based interceptor in 2004. It is this plan that the agency has now decided to suspend indefinitely.

The whole missile-defense program is a very high priority for President Bush and for Defense Secretary Donald Rumsfeld (who has been a major proponent of space-based defenses for a decade). Bush decided last December to start deploying anti-missile missiles next year—10 ground-based interceptors in Fort Greeley, Alaska (for midcourse defense), with another 10 fielded in 2005, and more soon after. As a prelude to that decision, he announced that the United States would no longer observe the 30-year-old

Anti-Ballistic Missile Treaty, precisely to let him deploy those interceptors and conduct tests of other interceptors at sea and in outer space. (The ABM Treaty prohibited all these activities.)

But the question now becomes: If boost-phase intercept is grinding to a halt, what is the point of moving ahead so quickly, and expensively, on the rest of the program?

It may be no coincidence that the Pentagon suspended work on BPI shortly after the release of a massive, technically detailed study by the American Physical Society—one of the world's pre-eminent physicist organizations—which concludes that boost-phase intercept is a lot more complicated than anyone has previously grasped.

There are three ways to do boost-phase intercept. The most direct is to base the anti-missile interceptor on a satellite orbiting in space. When sensors (some of them also based in space) detect the launching of a missile, the interceptor is fired; it darts toward the missile, homes in on the booster's engine, and smashes into it, destroying it with pure kinetic force.

However, the APS study kicks some serious sand in this scheme. First, an adequate BPI defense will require several hundred satellites and interceptors because the satellites (and this is the Pentagon's assumption as well) must be low-orbiting. This means that, unlike high-orbiting geosynchronous satellites, they will not be positioned over the same patch of Earth at all times. Therefore, several satellites will be needed to cover one patch continuously. And, since nobody can predict which nation or terrorist will launch a nuclear missile—or from where—many, many more will be needed to provide continuous coverage of several patches. The APS calculates that more than 1,000 would be needed to provide enough coverage to intercept a single enemy missile. This may be an exaggeration; many spots of Earth can fairly safely be excluded as possible launch sites. Still, several hundred satellites would need to be in orbit, even under quite relaxed assumptions, considerably more than the U.S. space program's present launch rate could accommodate.

Second, the study notes that liquid-fuel missiles burn out in four minutes, solid-fuel missiles in three. Subtract from that the half-minute or so it will take to confirm a missile launch, and a boost-phase interceptor doesn't have much time to reach its target. The interceptor will have to be very fast and very agile. Both characteristics will require it to carry much fuel, which requires it to be quite large—larger than an ICBM, the study calculates, and able to accelerate four times as quickly. "Such interceptors have never been built," the study notes, "and would push the state of the art." They would also require fairly enormous satellites to carry them.

The Missile Defense Agency is conducting very early research into a space-based *laser*, which would get around some of these problems. However, such a laser is at least 20 years away; not a single component of it remotely exists today. The APS study also points out that the atmosphere would dissipate the focus of a laser beam, and thus drastically reduce its ability to destroy an ascending missile. A laser's range is also much shorter than a kinetic interceptor and so would require still more satellites.

On a more mundane level, the Pentagon does have research programs on ground-based and ship-based BPI, which are not affected by the suspension of space-based BPI. However, the APS study calculates that a terrestrial interceptor would have to be very close to the launch site, in some cases just a few dozen miles away. This might be feasible if the likely launcher were North Korea (the interceptor could be placed in South Korea or on an Aegis cruiser in the Sea of Japan), but even then—assuming permission would be granted—the interceptors and the ship would themselves be vulnerable to a pre-emptive strike.

In short, even the most apparently straightforward aspects of a missile-defense system are turning out to be hugely—perhaps insuperably—complex, expensive, and operationally dubious. And the APS doesn't even get into the issues of "battle management" (how to convey signals from the early warning sensors to the weapons, how to fire the weapons, how to determine whether the target was hit, and thus whether more weapons need to be fired). Nor, more seriously still, does it outline the complications of dealing with an enemy that's resourceful enough to fire more than one missile.

At what point does someone calculate that the whole project is so drenched in fantasy that it isn't worth the trouble of getting it started?

Fred Kaplan writes the "War Stories" column for ***Slate***.

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